MUNICIPAL WATER DISTRICT OF ORANGE COUNTY

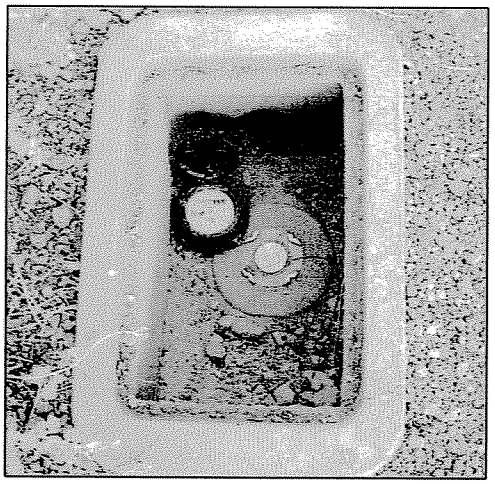
U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
RECLAMATION
Managing Water in the West

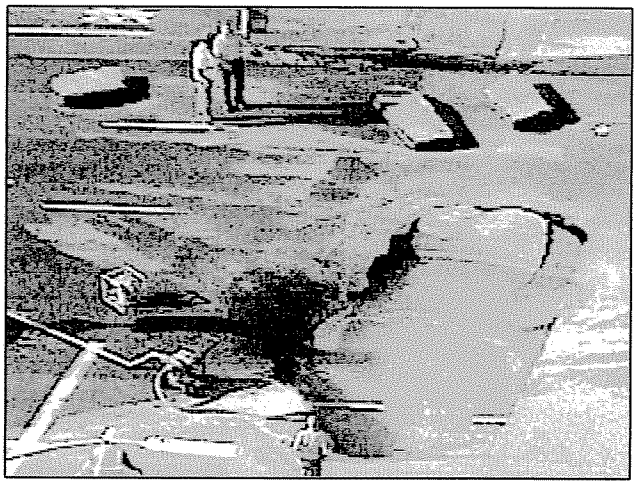
MWDOC Water Loss Management Program Assessment

Final Report

Water Use Accountability

March 2007





Project 4109-008

MALCOLM PIRNIE

Acknowledgements

The Project Team appreciates the opportunity afforded it through funding of this project by the United States Bureau of Reclamation Southern California Area Office under its Water Conservation Field Services Program and equal financial participation by the Municipal Water District of Orange County (MWDOC).

The project representative from the Municipal Water District of Orange County was Mr. Joe Berg, Water use Efficiency Program Manager. Primary representatives from the City of Tustin Water Services Division included Mr. Fred Adjarian, Water Services Manager, Mr. Art Valenzuela, Water Treatment Supervisor, Mr. Jose Diaz, Acting Water Construction/Maintenance Supervisor, and Mr. Kunal Mittal, Associate Engineer. City of Tustin staff graciously collected information requested by the Consultant Project Team required to perform a simplified American Water Works Association (AWWA) Water Audit using newly-developed public domain spreadsheet software from the AWWA Water Loss Control Committee.

The Project Team appreciates the efforts of MWDOC and Tustin in the collection of critical field information. The Mesa Consolidated Water District collaborated with MWDOC and the City of Tustin in assembling and installing appropriate field water metering data logging equipment to characterize residential water use. The City of Tustin identified, extracted, and tested a sample of in-service residential water meters for accuracy testing.

The Malcolm Pirnie Consultant Project Team consisted of Reenu Kaur, Nina Jazmadarian, Roxana Silva-Cobbs, and Steve Davis (Project Manager).

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Acronyms and Abbreviations

AB	Assembly Bill
ACT	Urban Water Management Planning Act of 1983
AF	Acre-Feet (325,851 gallons)
AFY	Acre-Feet per Year
AWWA	American Water Works Association
AwwaRF	AWWA Research Foundation
BMP	Best Management Practices
CALSIM	California Water Allocation and Reservoir Operations Model
CCF	Hundred Cubic Feet (748 gallons)
CEQA	California Environmental Quality Act
CII	Commercial, Industrial and Institutional
CIP	Capital Improvement Program
CRA	Colorado River Aqueduct
CUWCC	California Urban Water Conservation Council
CVP	Central Valley Project
DWR	Department of Water Resources
EOCWD	East Orange County Water District
EPA	Environmental Protection Agency
GPCD	Gallons Per Capita Per Day
GPM	Gallons Per Minute
In	Inches
ILI	Infrastructure Leakage Index
IRP	Integrated Resources Plan
IRWM	Integrated Regional Water Management
ISO	Insurance Service Organization
IWA	International Water Association
M&I	Municipal and Industrial
MAF	Million Acre-Feet
MCWD	Mesa Consolidated Water District
MGD	Million Gallons per Day
MOU	Memorandum Of Understanding
MWD	Metropolitan Water District of Southern California
MWDOC	Municipal Water District of Orange County
NRW	Non-Revenue Water
OC	Orange County
OCSD	Orange County Sanitation District
OCWA	Orange County Water Association
OCWD	Orange County Water District
SB	Senate Bill
SWP	State Water Project
SWRCB	State Water Resources Control Board
TAF	Thousand Acre-Feet
TWS	Tustin Water Services

UARL	Unavoidable Annual Real Losses
USBR	U.S. Bureau of Reclamation (Reclamation)
UWMP	Urban Water Management Plan
WLCC	AWWA Water Loss Control Committee

Executive Summary

This report has been prepared to document results of a study jointly funded by the U.S. Bureau of Reclamation Southern California Area Office (Reclamation) and the Municipal Water District of Orange County (MWDOC). The study focus was a Water Loss Management Program Assessment of MWDOC retail member agencies. The three major study elements included the preparation and distribution of a water utility questionnaire, and the analysis and screening of questionnaire responses through follow up telephone interviews, a water utility questionnaire, and the performance of a demonstration water audit, using the American Water Works Association Water Loss Control Committee authored free water audit software. The study was performed under a professional services contract agreement between MWDOC and Malcolm Pirnie, Inc.

The following represent major study findings of the MWDOC and Malcolm Pirnie, Inc.

The following represent major study findings of the MWDOC Water Loss Management Program Assessment:

- ten of 29 MWDOC retail member agencies responded to a 94-question survey prepared in Microsoft Excel spreadsheet format.
- utility population for the ten reporting utilities varies from 3,000 to 200,000.
- reported water loss varies from 2 percent of supply to almost 20 percent.
- in many cases, questionnaire information was not consistent with data reported in MWDOC's Orange County Water Rates Survey.
- four of the ten reporting agencies conduct annual water audits.

- Follow-up telephone interviews took from a few minutes to an hour, depending on knowledge and interest of staff. Many contacted felt their water loss monitoring programs were excellent and effective.
- the City of Tustin was very interested in the details of the project and recognized the value in performing the demonstration audit. Based on Tustin's interest and reported water loss, they were selected for audit.
- this report responds to Best Management Practice (BMP) No. 3 in the CUWCC Memorandum of Understanding relating to water conservation.
- field data collection for one week in September on sample residential water meters in Tustin indicated 5.19% of total use was at low flow, 11.95% at medium flow, and 82.86% at high flow.
- ten residential meter accuracy tests were performed by Measurement Control Systems on meters having in-service cumulative flow of 1-3 million gallons.
- average meter accuracy was 89.7% for low flow, 95.2% for medium flow, and 97.0% for high flow.
- the weighted meter accuracy for Tustin residential meters was 98.12 percent, reflecting an average under-registration of 1.88 percent.
- the AWWA/IWA water audit software identifies two water loss categories as real water losses and apparent water losses.
- the AWWA/IWA water audit for Tustin for fiscal year 2004-2005 indicated the following:

  -total water supplied was 4,303.2 MG

  -non-revenue water was 472.3 MG

-water loss was 11.0 percent

-annual cost of real losses = $306,842

-annual cost of apparent losses = $133,939

-Infrastructure Leakage Index = 3.73

AWWA recommends a minimum of 70 water meter accuracy tests to be statistically significant, but Tustin results are more typical of a much larger database.

The following represent major study conclusions:

- the level of water loss in MWDOC retail water agencies varies significantly, and reported losses aren't consistent among report references.
- there is significant staff and consultant effort required to collect, organize, and format water supply and demand information for an AWWA/IWA water audit.
- the CUWCC BMP No. 3 on System Water Audit, Leak Detection, and Repair applies most to this report on MWDOC water loss management.
- MWDOC projected population and water demand growth requires continued focus on water conservation and water use efficiency.
- with existing and projected MWDOC member agency water losses at 40,000 acre-feet per year, there is substantial room for water-use efficiency by member agencies.
- the new AWWA/IWA water audit methodology and spreadsheet software provide an excellent tool for assessing a utility's water balance and potential value of water saved through loss management.
- field data collection of residential time-of-day water use indicated only 5.2 percent at low flow. This result was surprisingly low to the Consultant Team.

- Plots of meter accuracy versus cumulative flow were consistent with results from other western U.S. utilities showing reduced accuracy at low flow with increased cumulative volume through the meter.

Based on the above mentioned findings and conclusions, the following are recommendations for further consideration by MWDOC and its member retail water agencies:

1. MWDOC should enhance the accuracy of audit work for the City of Tustin by conducting additional field investigations on calibration and validity testing of water supply meters and on leak detection surveys.
2. Water audits in the AWWA/IWA spreadsheet software format should be prepared for additional MWDOC retail member agencies to characterize water loss issues throughout its service area.
3. Additional grant applications to the U.S. Bureau of Reclamation and the California Department of Water Resources should be prepared and submitted in pursuit of follow-up funding of water audit work.
4. Results of this study should be shared with the CUWCC to advocate the extended application of the AWWA/IWA Water Audit methodology to other signatories to the MOU.
5. MWDOC retail member agencies and other California conservation-conscious water utilities should begin collecting and organizing the necessary water supply and customer demand information to conduct a standard annual water audit using AWWA/IWA methodology and to perform periodic updates.

6. Upon collection of multiple utility audits, a database should be developed to compare audit results, utility standard performance indicators, and water loss reduction methodologies and successes.

1.0 Introduction

1.1 Project Overview

Malcolm Pirnie was retained by the Municipal Water District of Orange County (MWDOC) to perform a Water Loss Management Program Assessment of its 29 retail member agencies. The project was jointly funded equally by the US Bureau of Reclamation (Reclamation) under its Water Conservation Field Services Grants program and MWDOC.

The project objectives were to develop a retail member agency water utility questionnaire, based on responses to conduct follow up interviews with five member agencies, to select one member agency for a demonstration water audit using available information and the American Water Works Association (AWWA)/ International Water Association (IWA) audit methodology, and to extrapolate results to all MWDOC member agencies to determine potential non-revenue water (formerly unaccounted-for water) reductions.

The project was accomplished through seven scope of work tasks, as indicated below:

1. Kickoff Meeting and Data Collection.
2. MWDOC Water Use Accountability.
3. Leakage Management Program and System Operations Review.
4. MWDOC Water Management Plan (WMP).
5. Retail Member Agency Water Audit.
6. Retail Member Agency Field Data Collection.
7. Project Management and Reporting.

1.2 Purpose of Final Report

This Final Report for the project documents the results of Scope of Work tasks 1-7. Task 2 included the preparation, distribution, and analysis of responses to a comprehensive retail member agency utility questionnaire. The questionnaire was based on a survey previously developed for the AwwaRF (American Water Works Association Research Foundation) Project 2928 on Water Loss Control Technology and restructured specifically for MWDOC member agencies by consultant and staff. Section 2 of this report describes the questionnaire and presents results for the responding agencies. Of those agencies responding to the questionnaire, five were selected for follow-up telephone interviews to better determine and assess individual water audit and water loss management practices that currently result in favorable low amounts of non-revenue water or may benefit from a more detailed evaluation. Section 3 of this report discusses the results of the telephone interviews and recommends a single member agency for a demonstration water audit. Section 4 describes the MWDOC and City of Tustin Urban Water Management Plans and implications of water loss management for MWDOC and its member agencies in achieving utility water conservation targets. Section 5 discusses the approach and results of an AWWA water audit for the City of Tustin using the AWWA Water Loss Control Committee Spreadsheet software. Section 6 presents results of field investigations of residential water demand and meter accuracy testing in Tustin. Section 7 presents findings, conclusions, and recommendations.

2.0 Utility Questionnaire

2.1 Description

A 94-question survey was prepared in Microsoft Excel spreadsheet format to solicit input from MWDOC retail member agencies. A definition section was included in the utility questionnaire table of contents sheet to guide the responders. There were five specific work sheet categories, including utility information, pipe materials, delivery pressures and modeling; customer metering; water supply auditing; and leakage management. Questionnaires were sent to 29 MWDOC member agencies in December 2005. It took approximately six weeks to receive questionnaires back from ten member agencies. This represents a participation rate of approximately 35 percent.

2.2 Questionnaire Responses

The following ten MWDOC retail member agencies responded to the Utility Questionnaire:

- City of Brea
- City of Fountain Valley
- City of Huntington Beach
- City of San Clemente
- City of Tustin
- City of Westminster
- East Orange County
- Laguna Beach
- Moulton Niguel
- City of Newport Beach

Fully-completed questionnaires for the ten water utility member agencies are provided in Appendix A found at the end of this Report. Table 1 provides a summary of specific information supplied by the ten utilities. Simple comparative information includes service population, number of service connections, annual water supply volume, and reported water loss as a percent of supply. Utility population varies from about 3,000 to 200,000. Number of service connections varies from about 1,200 to 53,000. Annual supply volume varies from 1,000 acre-feet to 36,000 acre-feet. Reported water loss varies from about 2 percent to almost 20 percent.

Table 1: General Information on Utilities Submitting Questionnaires

MWDOC Utility	Population	Service Connections	Annual Supply Volume	Reported Annual Loss
City of Brea	39,584	11,645	11,068 AF/YR	8.0%
City of Fountain Valley	57,495	17,506	11,683	3.0%
City of Huntington Beach	196,954	52,185	30,108	7.6%
City of Newport Beach	76,382	26,361	17,075	1.7%
City of San Clemente	43,900	17,070	11,341	3.8%
City of Tustin	65,000	14,509	12,760	19.6%
City of Westminster	92,270	20,024	12,860	missing
East Orange Co. Water District	3,195	1,196	993	3.0%
Laguna Beach Co. Water District	24,500	8,520	4,467	5.5%
Moulton Niguel Water District	165,398	53,298	36,415	4.2%

Table 2 presents more detailed questionnaire statistics and comparisons for the ten utilities, which responded. Percent of MWDOC supply varies from 16 to 100 percent. Average static water pressure in the distribution system varies from 60 to 100 psi. Percent of metallic pipeline varies from 0 to 100. Average residential water meter replacement varies from 10 to 20 years. Four of the ten agencies conduct annual water audits. Reported sources of water loss were leaks, flushing, reservoirs, and water meters.

Table 2: Detailed Questionnaire Statistics

MWDOC Utility	Percent MWDOC Supply	Percent Ground Water	Static Pressure (PSI)	Percent Metal Pipe	Residential Meter Replacement	Conduct Annual Audit	Sources of Water Loss	Leak Detection Methods
City of Brea	50%	50%	60-100	100%	15 years	No	Leaks	Passive
City of Fountain Valley	28%	66%	72	3%	20 years	No	Flushing	Passive
City of Huntington Beach	64%	36%	46-80	5%	15 years	Yes	Reserv. Leaks	Active
City of Newport Beach	34%	66%	75	20%	15 years	No	Flush/Leaks	Active
City of San Clemente	94%	5%	70	20%	10 years	No	Not Reported	Active
City of Tustin	16%	84%	65-70	23%	15 years	No	Meters/Leaks	Passive
City of Westminster	34%	66%	60	0	15 years	Yes	Not Reported	Passive
East Orange Co. Water District	37%	63%	80	34%	10 years	No	Meters/Leaks	Passive
Laguna Beach Co. Water District	100%	0	60	6%	20 years	Yes	Meters/Leaks	Active
Moulton Niguel Water District	83%	0	100	9%	20 years	Yes	Meters/Leaks	Active

Half of the ten utilities use some method of active leak detection in addition to visual identification of leaks. Information presented in Table 1 and Table 2, as well as perceptions of utility water audit data availability and potential benefit of performing a water audit, were used to select five member agencies for follow-up telephone discussions and collection of additional information regarding the perceived need for and benefits of performing a water audit.

3.0 Telephone Follow-Up

3.1 MWDOC Member Agency Screening

Five of the ten responding member agencies were selected through collaboration with MWDOC staff. These utilities were:

- City of Brea
- City of Huntington Beach
- City of Tustin
- Laguna Beach County Water District
- Moulton Nigel Water District

Pre-arranged appointments were made with individuals identified on the utility questionnaire as the water use efficiency point of contact. In some cases, the utility desired the participation of multiple utility staff having multiple levels of responsibility and levels of expertise.

A typical telephone agenda included the following discussion items:

1. Introductions and purpose of the USBR grant project
2. Discussion and clarification of the Utility Questionnaire
3. Potential for water distribution system corrosion
4. Existing system water quality issues
5. Predominant water meter sizes and manufacturers
6. Meter accuracy testing frequency and methods
7. Residential water meter replacement criteria
8. Recent water audit experience
9. Desire and usefulness of a simplified water audit

10. Availability of required audit data and staff assistance

11. Open discussion about the audit process and schedule

3.2 Recommended MWDOC Member Agency Audit

Based on telephone discussions, some of which were mere short clarifications of the questionnaire and one of which lasted about an hour, the City of Tustin was recommended to MWDOC for conducting a utility water audit. The next step was scheduling a meeting with utility staff to discuss details of the AWWA/IWA audit approach and recently developed spreadsheet-based software. Staff assistance in collecting the required water supply and demand information was solicited from the City of Tustin.

4.0 Urban Water Management Plans

Urban water management plans provide the context for conducting water conservation demonstration projects such as the one reported herein. This section discusses the background and requirements for urban water management plans and relevant provisions of the MWDOC and Tustin specific 2005 Urban Water Management Plans that relate to water conservation and utility- specific water loss management.

4.1 Introduction

The Urban Water Management Planning Act (Act), adopted in 1983, requires every urban water supplier providing water to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually to prepare and adopt an Urban Water Management Plan every five years. The Municipal Water District of Orange County, a water wholesaler and regional planning agency, fits the defined criteria and has prepared an Urban Water Management Plan to address the requirements set forth in the *State of California Water Code* Section 10610 through 10657.

Over the last 20 years, Urban Water Management Plans have evolved to become:

- sources of information for Water Supply Assessments and Written Verifications of Water Supply;
- long-range planning documents for water supply;
- source data for development of regional water plans;
- key components of Integrated Regional Water Management Plans; and
- a condition to qualify for receipt of certain State grant funds, such as Proposition 50.

4.2 MWDOC 2005 Urban Water Management Plan

MWDOC has used its latest five-year Urban Water Management Plan (2005) to:

- Evaluate supply-reliability goals for the region and provide a comprehensive assessment of water resource needs in its service area;
- Provide a regional perspective on current and proposed water use efficiency programs and identify measures that can be accomplished in a cost-effective manner;
- Provide assistance to maximize the beneficial use of local resource supplies that reduce the need for imported supplies; and
- Provide information that will allow the public to gain a better understanding of the region's comprehensive water planning.

Consistent with the above objectives, MWDOC's plan documents its water use efficiency efforts. In 1991, MWDOC signed a Memorandum of Understanding (MOU) monitored by the California Urban Water Conservation Council (CUWCC), which outlines 14 Best Management Practices for urban water conservation. The urban water conservation practices are intended to reduce long-term urban demands and are in addition to programs that may be instituted during occasional water supply shortages. As a wholesaler, MWDOC is committed to developing and implementing regional conservation programs on behalf of its retail water agencies and their customers. This regional approach enables economies of scale, ensures a consistent message to the public, and assists in the acquisition of grant funding of program implementation.

To facilitate the implementation of Best Management Practices (BMPs) throughout Orange County, MWDOC focuses its effort on the following three areas:

- Regional Program Implementation: MWDOC develops, obtains funding for, and implements regional BMP programs on behalf of all retail water agencies in its service area.
- Local Program Assistance: Upon request, MWDOC assists retail agencies in developing and implementing local programs within their individual service areas.
- Research and Evaluation: In the past five years, MWDOC has conducted research that allows agencies to measure the water-savings benefits of a specific program and then compare those benefits to the costs of implementing the program.

This water conservation demonstration project jointly funded by the US Bureau of Reclamation and MWDOC is consistent with the third bullet above in testing new water audit methodologies in MWDOC retail agencies to assess cost-effectiveness.

MWDOC's Mission Statement is *To provide reliable, high-quality supplies from Metropolitan Water District of Southern California and other sources to meet present and future needs, at an equitable and economical cost for all Orange County, and to promote water use efficiency.*

Related water conservation goals and objectives include:

- Guide Metropolitan in its planning efforts and act as a resource of information and advocacy for member agencies;
- Work together with Orange County water agencies and others to focus on solutions and priorities for improving Orange County's future water supply reliability;

- Cooperate with and assist OCWD and other agencies in coordinating the balanced use of the area's imported water to its member agencies;

As a regional wholesaler of imported water, MWDOC's most significant roles are broadly applicable to all of its member agencies. A key goal of MWDOC is to provide services that the retail agencies cannot reasonably provide as single entities.

4.2.1 MWDOC Service Area Population

According to the California Department of Finance, the MWDOC service area had a population of 1 million in 1970 and 2.2 million in 2005. This represents an average growth of 2.3 percent per year. According to the SCAG Regional Transportation Plan, the now 30-agency MWDOC service area population will grow to 2.64 million by 2030. Table 4.1 below indicates the five-year historical and projected MWDOC population from 1970 through 2030.

Table 4-1 Historical and Projected MWDOC Population

Year	1970	1975	1980	1985	1990	1995	2000	2005	2010	2015	2020	2025	2030
Population (Millions)	1.01	1.23	1.40	1.54	1.73	1.86	2.04	2.24	2.41	2.48	2.54	2.59	2.64

4.2.2 MWDOC Service Area Water Demand

Historical water demand has increased from 285,200 acre-feet in 1970 to to 521,400 acre-feet in 2000 for the MWDOC Service Area. Municipal and Industrial uses have more than doubled, whereas Agricultural use has declined significantly as shown in Table 4.2 below.

Table 4-2 Historical MWDOC Service Area Water Demand (Acre-Feet)

Demand	1970	1975	1980	1985	1990	1995	2000
Municipal & Industrial	220,500	272,800	341,100	413,600	447,100	417,700	500,800
Agricultural	64,700	53,700	40,800	41,900	20,800	10,700	20,600
Total	285,200	326,500	381,900	455,500	467,900	428,400	521,400

Over the period 1970 to 2000, per capita water use has varied between 180 gallons per capita per day to 230 gallons per capita per day. Recently, per capita use has averaged about 200 gallons per person per day for all municipal and industrial uses.

To project future water demands, the MWDOC Urban Water Management Plan presented two different methodologies. Whereas the Plan adopted the method reported in the MWDOC Annual 25-Year Survey using individual member agency projections for years 2005-2030 in five-year increments, this study finds the Metropolitan MWD-Main forecast of M & I water use in the service area with conservation more useful. This is due to the itemization of projected water system losses at about 7.4 percent of total projected demand.

Table 4-3 MWDOC Service Area Projected M & I Water Demand

	2005	2010	2015	2020	2025	2030
MWD-Main						
Single Family	249,676	257,808	263,043	270,024	274,860	279,652
Multi-Family	67,474	72,055	75,661	77,455	78,643	79,979
Non-Residential	147,447	165,052	168,742	174,406	178,103	181,313
System Losses	37,182	39,341	40,294	41,389	42,118	42,827
Total	501,780	534,257	547,739	563,274	573,724	583,771
Individual Agencies	504,997	542,881	569,905	593,137	605,858	611,757

All member agencies have water system losses in terms of real water loss due to transmission system, distribution system, reservoir, fire hydrant and service connection leakage. Since municipal and industrial demand in MWDOC is projected to increase, and water system losses are projected to increase, MWDOC is concerned about demonstrating and implementing successful methodologies to help its member agencies become more water efficient.

4.2.3 MWDOC Water Use Efficiency Program

Along with groundwater, recycled water, and imported water, MWDOC recognizes that water use efficiency is a low-cost source of new supply for its service area. MWDOC demonstrated its commitment to improving its efficiency by signing a Memorandum of Understanding (MOU) with the California Urban Water Conservation Council (CUWCC) in 1991. The MOU commits MWDOC to implementing conservation Best Management Practices (BMPs) which are cost effective. BMPs are policies, programs,

rules, regulations, ordinances, and technologies that have been accepted by the water industry as providing a reduction in water demand.

The CUWCC has adopted 14 BMPs that include technologies and methodologies demonstrated to result in more efficient water use.

This demonstration project is consistent with CUWCC BMP No. 3 relating to System Water Audits, Leak Detection, and Repair. All retail water agencies in Orange County are actively implementing BMP-based programs. However, not all retail water agencies are signatories to the MOU. While implementation of most BMPs is the responsibility of retail water agencies, wholesale water agencies, such as MWDOC, are responsible for BMP 10 Wholesale Agency Assistance Programs and develop and implement regional programs on behalf of their retail member agencies and customers. Since MWDOC does not own and operate a distribution system, implementation of BMP No. 3 is not applicable. However, to assist its retail agencies, MWDOC publishes an annual report called "The Orange County Water Agencies Water Rates, Water System Operations, and Financial Information." This survey estimates volume and percent of "unaccounted-for-water" for each retail water agency in Orange County. In 2004, the range of retail water agency "unaccounted-for-water" was 1.2 percent to 10.7 percent. The average was 5.1 percent. This is a little lower than the 7.4 percent predicted by the Metropolitan MWD-Main model in Table 4.3. Since most agencies have not performed

official water audits, individual agency estimates require validation applying industry audit best management practices.

4.3 Tustin 2005 Urban Water Management Plan

The Tustin 2005 Urban Water Management Plan is discussed herein, since this study recommended Tustin for a demonstration AWWA/IWA standard water audit using new spreadsheet software from the AWWA Water Loss Control Committee. Results of the Audit are presented in Section 5.0 of this report.

The City of Tustin Water Services Division (CTWS) provides potable water service to most of the incorporated area of the City of Tustin and some unincorporated county areas north of the City. CTWS' water service area is 8.4 square miles and is predominantly residential, with over 90 percent of water services being single-family and multi-family residences. Tustin's service area population was 62,131 in 2005. Since the area is essentially built-out, the projected population for 2030 remains at 62,100.

Based on 2000 and 2005 water supply and metered demand comparisons for CTWS, Tustin's Urban Water Management Plan 2005 projects "Unaccounted-for Water" losses at 11.3 percent through 2030, or about 1,330 acre-feet per year. The purpose of the demonstration water audit reported herein is to define sources of this water loss and recommend methods to reduce the amount. CTWS maintains an emergency response program that aggressively repairs main breaks, hydrant leaks or breaks, and meter leaks. Staff is available to repair main and hydrant breaks and promptly restore water service. All reported water meter leaks are investigated and repaired the same day.

5.0 Retail Member Agency Water Audit

5.1 Introduction

In accordance with Task 5 of the Scope of Work, a retail member agency water audit was conducted by the Consultant Team. A water audit for the City of Tustin was performed for fiscal year 2004-2005 using the American Water Works Association (AWWA) / International Water Association (IWA) adopted water audit methodology.

CTWS provides potable water service to a population of approximately 60,000. To serve this population, the City of Tustin supplies approximately 84 percent of its water from wells extracting from the underlying groundwater aquifer, and the remaining 16 percent consists of imported treated surface water purchased from MWDOC. The City of Tustin currently utilizes twelve groundwater wells (Beneta, Columbus Tustin, Main Street No. 3 and No. 4, Newport, Prospect, 17th Street No. 1 and No. 2, Tustin, Vandenberg, Walnut and Yorba.). Seven wells pump directly into the distribution system without treatment. The remaining five wells receive treatment at two treatment facilities.

Water is pumped from the two treatment plants to three pressure zones in the distribution system. The distribution system covers an area of 8.4 square miles having a service area elevation range between 0 and 480 feet. The Tustin distribution system consists of 172 miles of water mains and 14,048 active and inactive service connections. There are three pressure zones in the distribution system with an average static pressure of 65 pounds per square inch (psi). The CTWS's water distribution system piping consists primarily of asbestos cement, polyvinyl chloride (PVC), and ductile iron mains.

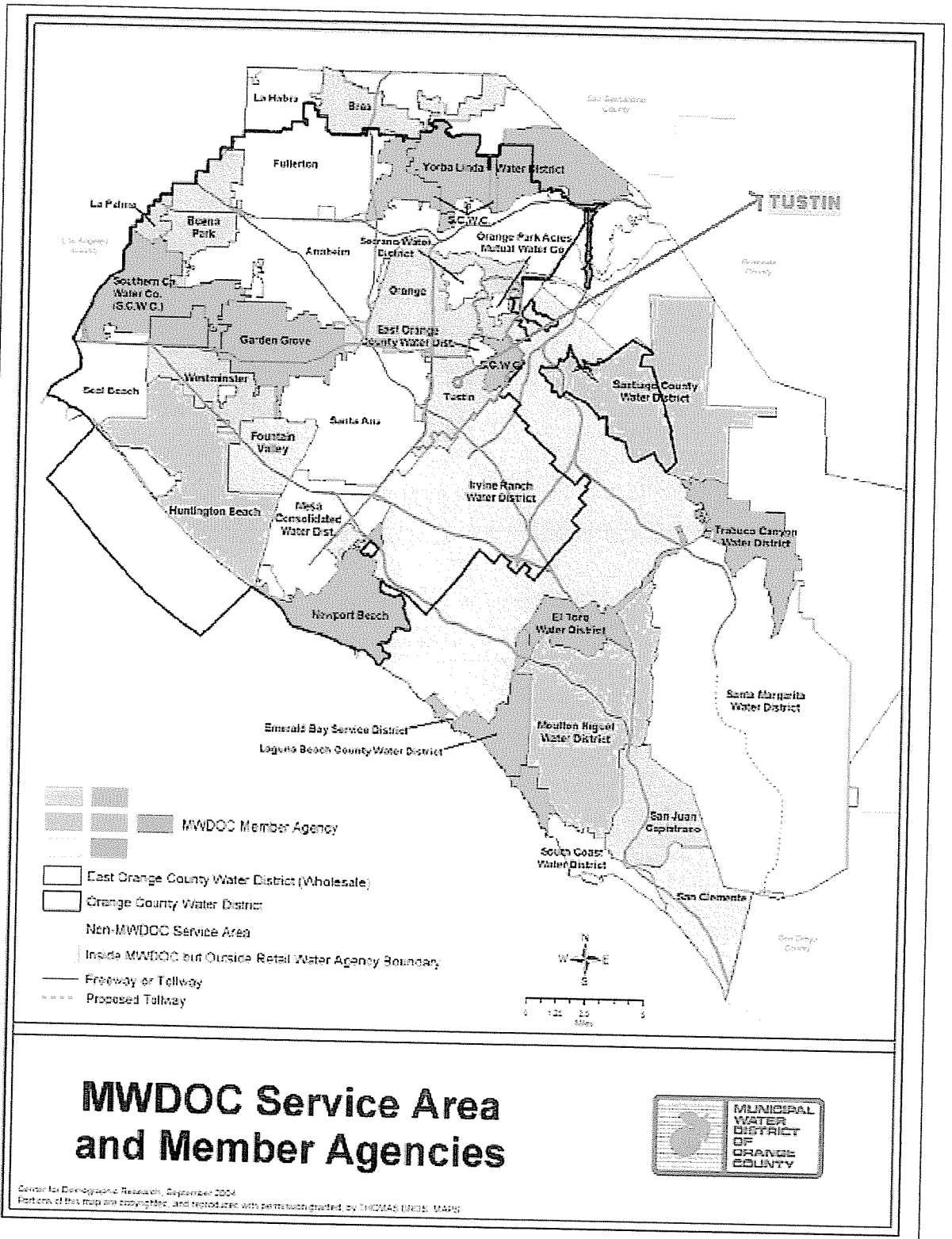
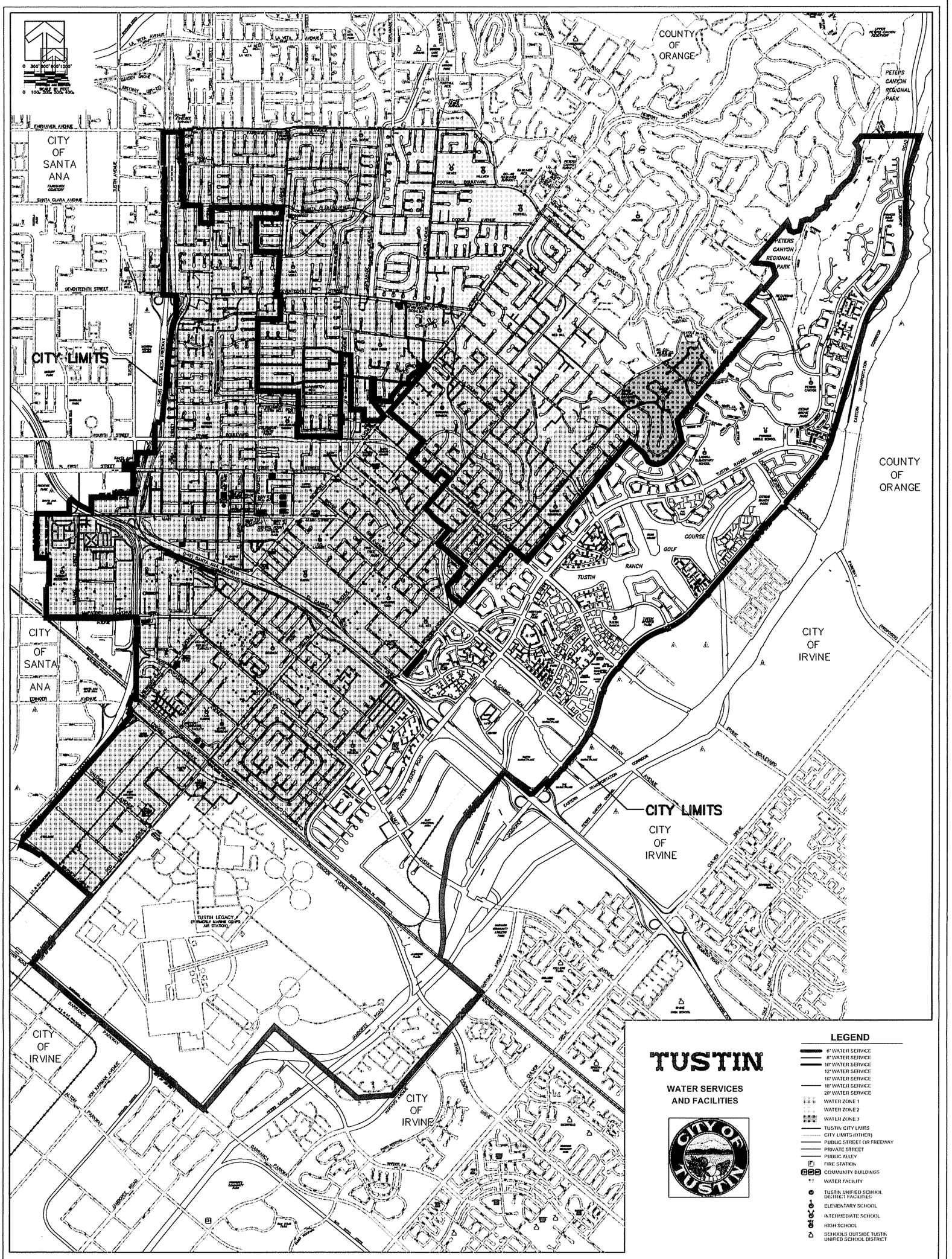


Figure 5-1: Map of the Service Area of the Municipal Water District of Orange County


COUNTY OF ORANGE
PETERS CANYON REGIONAL PARK
CITY OF SANTA ANA
CITY LIMITS
COUNTY OF ORANGE
CITY OF IRVINE
CITY LIMITS
CITY OF IRVINE
CITY OF SANTA ANA
CITY OF IRVINE
TUSTIN LEGACY (FORMERLY MARINE CORPS AIR STATION)
CITY OF IRVINE
TUSTIN
WATER SERVICES AND FACILITIES
LEGEND
6" WATER SERVICE
8" WATER SERVICE
10" WATER SERVICE
12" WATER SERVICE
16" WATER SERVICE
18" WATER SERVICE
20" WATER SERVICE
WATER ZONE 1
WATER ZONE 2
WATER ZONE 3
TUSTIN CITY LIMITS
CITY LIMITS (OTHER)
PUBLIC STREET OR FREEWAY
PRIVATE STREET
PUBLIC ALLEY
FIRE STATION
COMMUNITY BUILDINGS
WATER FACILITY
TUSTIN UNIFIED SCHOOL DISTRICT FACILITIES
ELEMENTARY SCHOOL
INTERMEDIATE SCHOOL
HIGH SCHOOL
SCHOOLS OUTSIDE TUSTIN UNIFIED SCHOOL DISTRICT

A map of the service area for MWDOC is shown in Figure 5-1, and the map of service area of the City of Tustin is shown in Figure 5-2.

5.2 Task Objectives

The major objective of Task 5 is to perform a water system audit for the City of Tustin using AWWA/IWA water audit spreadsheet populated with the data provided by the CTWS utility staff for FY 2004-2005. The water audit includes a calculated water balance table to compare water produced with metered consumption and to estimate real and apparent water losses.

The major goals of performing the Tustin water audit are:

- To quantify the amount and percentage of non-revenue water for FY 2005 based on the authorized uses and the estimated unauthorized uses associated with unmetered water.
- To determine the water supply efficiency of the system by accurately determining the quantities of water produced and accounting for all water that reaches its intended or unintended destinations.
- To develop a water balance, which compares water produced with metered consumption. The difference is an estimation of real and apparent water loss.
- To determine the technical performance indicators for real losses due to system leakage.
- To evaluate the potential for modifying system pressure during certain periods of the day to reduce distribution system leakage without affecting delivery of domestic and fire protection needs.

- To prepare a water audit report which includes the standard audit spreadsheet for MWDOC management team and retail member agency review.

5.3 AWWA/IWA Spreadsheet Water Audit Software

A Microsoft Excel spreadsheet software has been developed by the AWWA Water Loss Control Committee for performing a comprehensive water utility audit. The major objective behind the development of this software is to bring the best practice water audit methodology developed by the International Water Association and the AWWA to all utilities, to make the water audit terms and definitions standardized throughout the industry to assess water supply efficiency in a standard reliable manner, and to give utilities a user-friendly way to compile and compare their water audit data with other utilities. This spreadsheet-based software helps to quantify, as well as track, the water losses, which may occur in water distribution systems. It also helps in identifying areas where efficiency can be improved, and cost can be recovered. Since the AWWA/IWA water audit methodology gives consistent definitions for the major forms of water consumption and water losses encountered in drinking water utilities, it is considered universally applicable. In order for water utilities to make a meaningful assessment of their water loss, this software consists of a set of performance indicators (financial and operational) that evaluate utilities on system-specific features, such as average pressure in the distribution system and total length of water mains. The term "unaccounted-for water" is no longer used in the international water community and has been replaced by the term "non-revenue water".

The AWWA Water Audit Software is a Microsoft Excel spreadsheet workbook consisting of five worksheets. The five worksheets contain the following:

- The First worksheet provides instructions on the use of the software and allows the user to input the general information about the water audit being performed.
- The Second worksheet is the reporting worksheet, which acts as an input data screen prompting the user to enter all of the required information about the water supply, such as the volume of water supplied, customer consumption, and various quantities of losses in the distribution system in order to perform the water-balancing calculations. It also prompts for the utility-specific information, such as average distribution system pressure, length of mains, etc. for calculating the performance indicators.
- The Third worksheet is a water balance worksheet, which shows summarized totals of each component of the water audit in columns. The table format balances all of the water entering the system with all of the water leaving the system by performing a top down water audit to determine real water losses. All of the values entered by the user on the Reporting Worksheet are utilized for calculating the components of the water balance sheet. In Figure 5-3, the summation of "water from own sources" and "water imported" is the total system input volume. It can be clearly seen that all of the losses, which used to fall under the category of so-called "unaccounted-for water" have been replaced by "non-revenue water" per the AWWA/IWA methodology.

<table>
<tr><td rowspan="8">Water From Own Sources</td><td rowspan="9">Water Supplied to the retail customers</td><td colspan="4">Billed Water Exported</td></tr>
<tr><td rowspan="3">Authorized Consumption</td><td rowspan="2">Billed Authorized Consumption</td><td>Billed Metered Consumption (including water exported)</td><td rowspan="2">Revenue water</td></tr>
<tr><td>Billed Unmetered Consumption</td></tr>
<tr><td rowspan="2">Unbilled Authorized Consumption</td><td>Unbilled Metered Consumption</td><td rowspan="7">Non-Revenue Water (NRW)</td></tr>
<tr><td>Unbilled Unmetered Consumption</td></tr>
<tr><td rowspan="4">Water Losses</td><td rowspan="3">Apparent Losses</td><td>Unauthorized Consumption</td></tr>
<tr><td>Customer Metering Inaccuracies</td></tr>
<tr><td>Data Handling Errors</td></tr>
<tr><td>Water Imported</td><td rowspan="3">Real Losses</td><td>Leakage on Transmission and or Distribution Mains</td></tr>
<tr><td>Leakage and overflow at Utility's Storage Tanks</td></tr>
<tr><td>Leaks on Service Connections</td></tr>
</table>

Figure 5-3: The IWA "Best Practice" Standard Water Balance

- The Fourth worksheet consists of definitions and guidelines for use of all the terms established in the AWWA/IWA methodology. It is extremely easy to switch between the reporting worksheet to the definitions worksheet to have access to the meaning of each term for entering the appropriate data into the reporting worksheet.
- The Fifth worksheet determines the "Water Loss Standing" value, which helps in the interpretation of the results for the performance indicators. This worksheet provides the calculation of the ILI (Infrastructure Leakage Index) and its use as an approximate leakage reduction tool. The ILI is calculated by dividing the Calculated Average Real Leakage by the Unavoidable Annual Real Losses (UARL). The value of ILI acts as a good operational benchmark for real water loss control. A table showing the general guidelines for establishing a target ILI

range has been provided in this sheet. The availability of water resources to the utility is a determinant to setting a target ILI range.

The five worksheets have been attached as Appendix B to this Report.

5.4 Water Loss Management

Water losses in a distribution system may be divided into two categories - namely, real losses and apparent losses. Apparent losses are the paper losses that occur in utility operations due to customer meter inaccuracies, data errors in the billing process, and unauthorized consumption or water theft. In other words, this water is consumed, but it is unaccounted for, improperly measured, or un-paid. These losses reduce utility revenue and lead to distortion of data on customer consumption patterns. Real losses are the physical losses of water from the distribution system, including leakage and storage overflows. These losses inflate the water utility's production costs and put a stress on water resources, since they represent water that is extracted and treated but never reaches customers for a beneficial use. In order to make the water distribution system more efficient, utmost importance must be placed on water loss management. Independent of the type of method being used for performing a water audit, there will always be an uncertainty while calculating non-revenue water, apparent losses, and real losses.

The relationship shared by real losses from the IWA water balance and UARL (Unavoidable Annual Real Losses) is clearly shown in Figure 5-4. The UARL calculation is based on length of mains, number of services, customer meter location, and average pressure in the distribution system. There are four methods of managing real losses, which are indicated by the four arrows in Figure 5-4. Putting a focus on these four management methods can reduce real losses, but, at a given average system operating

pressure, the total real losses cannot be economically reduced any further than the value of UARL.

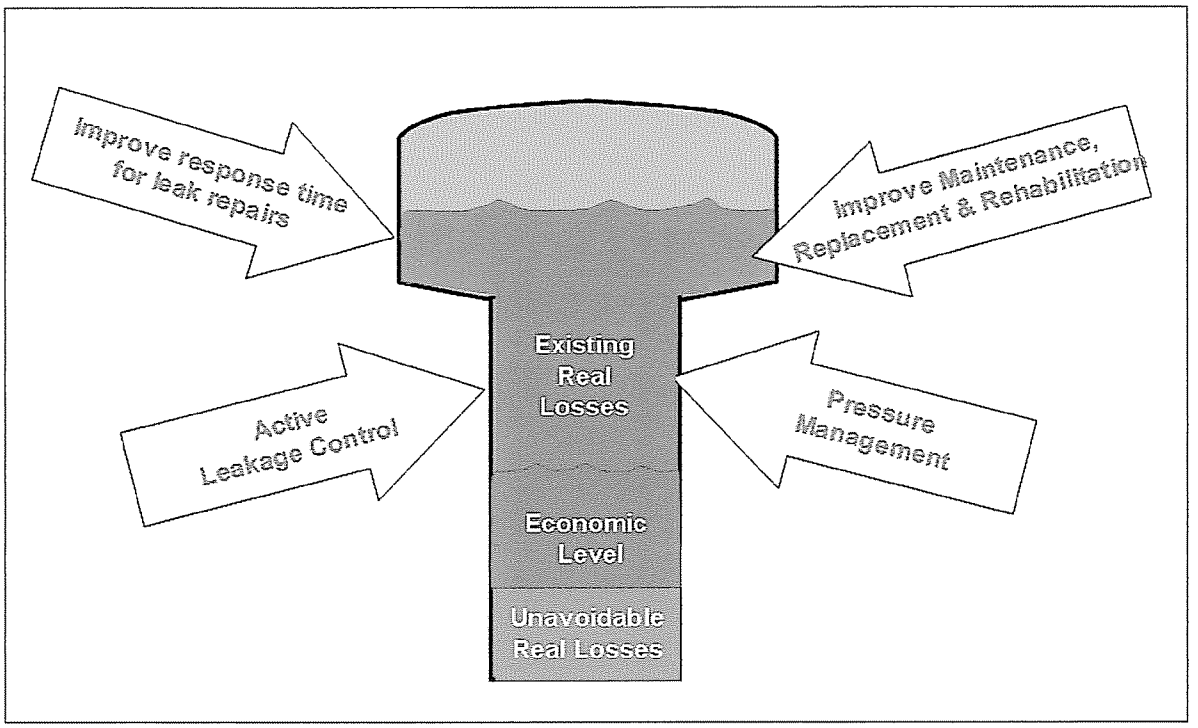


Figure 5-4: The four basic methods of managing Real Losses

Figure 5-5 shows the four basic methods for managing apparent losses. Dependent upon the amount of attention given to each component related to apparent losses in Figure 5-5, the losses will increase or decrease. A primary purpose of the utility is to keep real and apparent losses at a minimum to minimize use of water resources and maximize revenue.

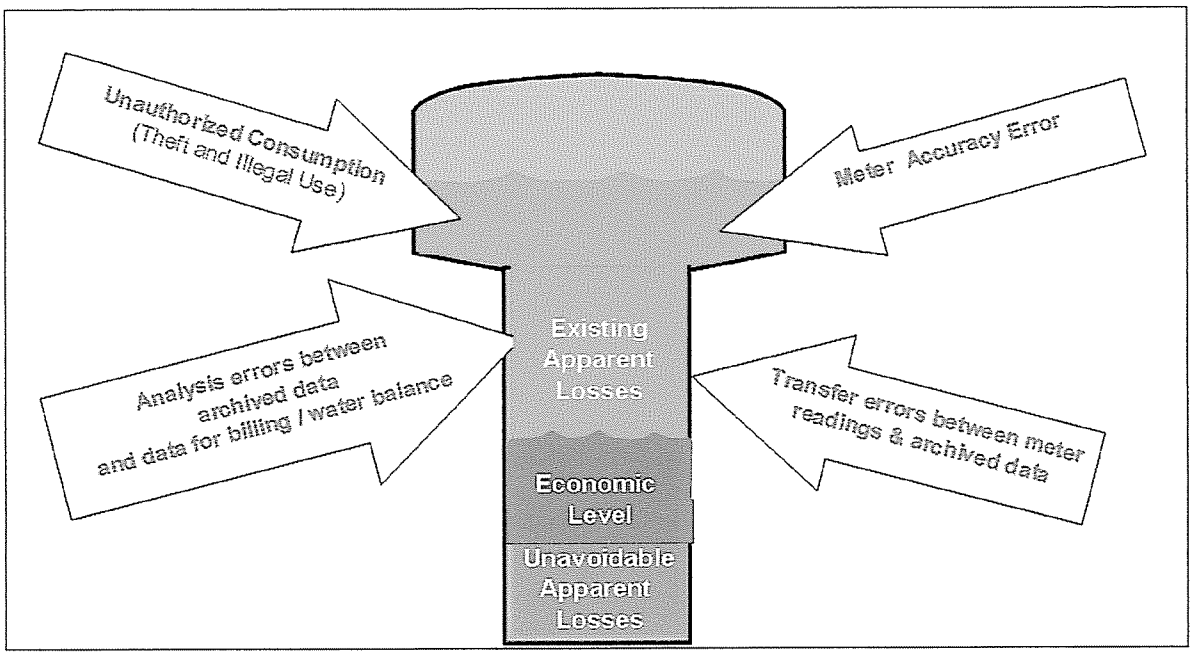


Figure 5-5: The four basic methods of managing Apparent Losses

5.5 Recommendations made by the AWWA Water Loss Control Committee

The water auditing methodology developed by the AWWA and IWA and associated performance indicators are recognized as the current best practice methodology for quantitatively monitoring water consumption and water loss in water distribution systems. The term "unaccounted-for-water" does not hold any consistent meaning, and, thus, should be eliminated in all the industry references. For controlling real losses and apparent losses occurring in the distribution system, the four controlling components shown in Figure 5-4 and Figure 5-5 should be used, which will further help to improve the overall efficiency of the system.

5.6 Water Audit Results

This Section presents the results of the annual water audit performed on the CTWS by using American Water Works Association (AWWA)/ International Water Association (IWA) Water Audit Software Version 2.0 along with the water balance sheet. All of the

data, which have been used in performing the Water Audit, have been either provided by CTWS staff or have been estimated based on the utility information provided in the initial project questionnaire and the Year 2005 edition of "The Orange county Water Agencies Water Rates, Water System Operations, and Financial Information" report prepared by MWDOC. All of the units for the data provided in the water audit spreadsheet have been converted to million gallons per year.

As per the information provided in the questionnaire by CTWS staff, 84 percent of water introduced into the distribution system is provided by the Tustin's twelve groundwater wells, and 16 percent of the water is purchased from MWDOC. Table 5-1 shows the annual volume of water pumped from these twelve groundwater wells for the Fiscal Year 2004-2005.

Table 5-1: Water Production Report for City of Tustin for FY 2005 (AF)

CITY OF TUSTIN WATER SERVICES
WATER PRODUCTION REPORT
PERIOD: JUNE 2005

SOURCE		QUANTITY PUMPED OR PURCHASED (A.F.)	YEAR TO DATE
WELLS - UNTREATED			
COLUMBUS TUSTIN	- 62-20-1B	0.0	535.4
BENETA	- 62-20-1A	0.0	379.6
LIVINGSTON	- 62-21-11A	0.0	0.0
VANDENBERG	- 62-17-3A	0.0	752.0
TUSTIN AVENUE	- 102-20-26A	0.0	304.0
YORBA STREET	- 102-03-8A	0.0	212.2
PROSPECT	- 102-08-2A	0.0	330.6
PANKEY	- 103-31-6A	0.0	0.0
WALNUT	- 104-06-10A	0.0	174.4
SUBTOTAL UNTREATED		**0.0**	**2,688.1**
MAIN STREET - TREATED			
MAIN STREET NO. 3	- 62-08-7A	72.2	419.5
MAIN STREET NO. 4	- 62-082-9F	102.6	1,078.7
SUBTOTAL MAIN STREET - TREATED		**174.8**	**1,498.1**
17TH STREET DESALTER - TREATED			
NEWPORT WELL NO. 3	- 102-25-11A	0.0	0.6
17TH STREET WELL NO. 3	- 102-232-22B	0.0	0.0
17TH STREET WELL NO 4	- 102-232-22C	64.6	1,267.1
SUBTOTAL 17TH STREET DESALTER - TREATED		**64.6**	**1,267.7**
TOTAL PUMPED		**239.4**	**5,453.9**
PURCHASED WATER			
ETHELSEE	- 123910	219.1	909.7
PROSPECT	- 94060376	26.8	405.1
HEWES	- 795749	81.8	861.9
RAWINGS RES.	- 795750	76.4	135.6
NEWPORT RES.	- 7812303	60.2	561.2
SUBTOTAL OC48		**464.3**	**2,873.5**
EOCWD PLANT	- 123960 (OC 33/DI)	94.9	773.8
OC43	-	492.6	4,102.3
TOTAL PURCHASED		**1,051.8**	**7,756.6**
TOTAL INTRODUCED INTO SYSTEM		**1,291.2**	**13,210.6**

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Table 5-2 shows a schedule of the amount of water pumped from Tustin's groundwater wells and amount of water purchased from MWDOC. The totals from Table 5-2 were applied to the total water supplied to the distribution system from the own sources and the total volume of imported water introduced into the distribution system in the AWWA/IWA water audit spreadsheet section for utility usage analysis. Note that data in the two tables are different for groundwater pumped due to imported water counted as groundwater in Table 5-2.

Table 5-2: Schedule of Water Pumped and Purchased for the City of Tustin Water Services (Acre-Feet and Percentage of Total)

CITY OF TUSTIN WATER SERVICES
Schedule of Water Pumped and Purchased (Acre Feet & % of Total)
Fiscal Year July 1, 2004, to June 30, 2005

	UNTREATED GROUNDWATER				MAIN STREET TREATED WATER				17TH STREET TREATED WATER				IMPORTED WATER				TOTAL		IMPORT WATER COUNTED AS GROUNDWATER
	MONTH	%	CUMULATIVE (Acre Feet)	%	MONTH	%	CUMULATIVE (Acre Feet)	%	MONTH	%	CUMULATIVE (Acre Feet)	%	MONTH	%	CUMULATIVE (Acre Feet)	%	MONTH	CUMULATIVE (Acre Feet)	IN-LIEU
2004																			
JULY	607.3	40.3%	607.3	40.3%	117.0	7.8%	117.0	7.8%	183.6	12.2%	183.6	12.2%	599.4	39.8%	599.4	39.8%	1,507.3	1,507.3	0.0
AUGUST	609.0	41.5%	1,216.3	40.9%	86.0	5.9%	203.0	6.8%	171.2	11.7%	354.8	11.9%	602.9	41.0%	1,202.3	40.4%	1,469.1	2,976.4	0.0
SEPTEMBER	565.7	40.9%	1,782.0	40.9%	61.3	4.4%	264.3	6.1%	126.9	9.2%	481.7	11.1%	628.5	45.5%	1,830.8	42.0%	1,382.4	4,358.8	0.0
OCTOBER	458.4	42.9%	2,240.4	41.3%	106.3	9.9%	370.6	6.8%	60.0	5.6%	541.7	10.0%	443.7	41.5%	2,274.5	41.9%	1,068.4	5,427.2	0.0
NOVEMBER	575.0	59.4%	2,815.4	44.0%	93.6	9.7%	464.2	7.3%	121.4	12.5%	663.1	10.4%	177.4	18.3%	2,451.9	38.3%	967.4	6,394.6	552.1
DECEMBER	523.3	57.8%	3,338.7	45.7%	44.7	4.9%	508.9	7.0%	123.1	13.6%	786.2	10.8%	213.5	23.6%	2,665.4	36.5%	904.6	7,299.2	522.1
2005																			
JANUARY	507.9	68.2%	3,846.6	47.8%	119.4	16.0%	628.3	7.8%	100.1	13.4%	886.3	11.0%	17.6	2.4%	2,683.0	33.4%	745.0	8,044.2	379.6
FEBRUARY	451.4	63.6%	4,298.0	49.1%	155.4	21.9%	783.7	9.0%	102.5	14.5%	988.8	11.3%	0.0	0.0%	2,683.0	30.7%	709.3	8,753.5	451.4
MARCH	516.9	61.1%	4,814.9	50.2%	173.3	20.5%	957.0	10.0%	93.3	11.0%	1,082.1	11.3%	62.1	7.3%	2,745.1	28.6%	845.6	9,599.1	302.1
APRIL	599.5	62.2%	5,514.4	51.4%	175.6	15.6%	1,132.6	10.6%	49.0	4.4%	1,131.1	10.5%	201.0	17.9%	2,946.1	27.5%	1,125.1	10,724.2	698.6
MAY	700.4	58.6%	6,214.8	52.1%	190.9	16.0%	1,323.4	11.1%	71.9	6.0%	1,203.0	10.1%	232.2	19.4%	3,178.3	26.7%	1,195.3	11,919.5	620.7
JUNE	700.4	54.2%	6,915.2	52.3%	174.8	13.5%	1,498.2	11.3%	64.6	5.0%	1,267.6	9.6%	351.4	27.2%	3,529.7	26.7%	1,291.2	13,210.7	700.4
Adjustment for In-Lieu Seasonal Storage Purchases			2,658.2																4227.0

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For calculating the total billed metered water, which is considered as an authorized consumption, the CTWS Water Billing information report prepared on a monthly basis, grouped by the different meter sizes for FY 2005, was used. This report is attached as Appendix C to this report. Monthly usage is reported in CCF Total annual billed metered water in million gallons per year was calculated to be 3,830.8 for 2004-2005.

The unbilled unmetered water, which is considered as authorized consumption, typically consists of water consumed in firefighting, flushing of mains and sewers, street cleaning etc. The quantity of unbilled unmetered water for the City of Tustin's water distribution system is 468 AF per year or 152.4 million gallons. The units for all of the given or available data were converted into million gallons before entering into the AWWA spreadsheet software.

5.6.1 Estimation of Average Residential Bi-Monthly Bill for the City of Tustin

The AWWA spreadsheet requires the average retail unit cost. Table 5-3 provides the information about the total volume of water consumed based on different meter sizes for FY 2004-2005. Annual average residential water use per customer, which is calculated by dividing the average annual water consumption (Table 5-3) recorded by all of the residential water meters (A) by the total number of residential connections (Table 5-3), is 153,320 gallons, i.e. 205 CCF (One Hundred Cubic Feet = 748 gallons). Bi-monthly average residential water consumption per customer is 34 CCF.

Table 5-3: Total Annual Water Consumption for each Meter Size for FY 2004-2005

City of Tustin - Consumption by Meter Size Chart															
		No.of mts	Consumption (Units = Gallons)												
Meter Size			Jul-04	Aug-04	Sep-04	Oct-04	Nov-04	Dec-04	Jan-05	Feb-05	Mar-05	Apr-05	May-05	Jun-05	Annual Consumption
NS		3	0	0	0	0	0	0	0	0	0	0	0	0	0
A	¾x¾	9,938	169,208,820	191,314,464	167,553,496	142,748,320	128,463,016	89,778,700	89,536,348	101,051,060	81,965,092	104,096,916	125,773,956	132,205,260	1,523,695,448
A(I)		1	0	0	0	0	0	0	0	0	0	0	0	0	0
A(J)		1	0	0	0	0	0	0	0	0	0	0	0	0	0
B	1"	2,952	111,196,932	97,971,544	109,653,060	74,802,244	86,821,108	49,296,940	49,637,280	67,884,740	49,201,944	56,757,492	79,985,884	68,272,204	901,481,372
C	1"-1½"	354	27,033,468	14,546,356	25,819,464	12,788,556	19,967,112	10,028,436	10,154,848	17,601,936	14,760,284	9,288,664	19,824,992	10,884,148	192,698,264
D	2"	569	96,132,960	92,432,604	89,935,032	71,786,308	69,958,196	63,212,732	59,464,504	66,889,152	58,300,616	62,291,196	76,440,364	69,428,612	876,272,276
E	3"	38	15,562,888	10,662,740	14,940,552	6,047,580	9,878,836	4,779,720	4,680,236	9,341,024	8,234,732	5,274,896	13,233,616	7,119,464	109,756,284
F	4"	56	15,089,404	14,042,204	13,009,964	6,767,904	13,501,400	7,459,804	7,454,568	5,595,040	5,123,800	9,751,676	9,470,428	11,757,812	119,024,004
G	6" or greater	100	6,990,808	14,039,960	7,782,192	9,729,984	6,236,076	10,634,316	10,885,644	6,108,916	4,631,616	11,554,356	8,465,864	10,748,760	107,808,492
I	Cheater Meter	31	33,660	0	0	0	11,220	0	0	0	5,236	0	0	16,456	66,572
I Inch	Fire Meter	1	0	0	0	0	0	0	0	0	0	0	0	0	0
J	Fire Meter	2	2,992	0	0	0	748	0	0	0	748	0	0	0	4,488
K	Fire Meter	1	0	0	0	0	0	0	0	0	0	0	0	0	0
L	Fire Meter	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Total		14,048	441,251,932	435,009,872	428,693,760	324,670,896	334,837,712	235,190,648	231,813,428	274,471,868	222,224,068	259,015,196	333,195,104	310,432,716	3,830,807,200

Based on the commodity rates per CCF and fixed charges for residential service for a bi-monthly period for 5/8" X ¾ " residential water meters (A) for the City of Tustin provided in Table 5-4, the average bi-monthly bill for a single residential meter was calculated to be $ 47.56. Based on the average bi-monthly water use for a residential meter, the customer retail unit cost per 1000 Gallons is $ 1.86.

Table 5-4: Commodity Rates and Fixed Charges for the City of Tustin for FY 2004-2005

CITY OF TUSTIN

Commodity Rates and Fixed Charges

Billing Period: ☐ Monthly ☑ Bi-monthly

Residential Service	$0.35	/100 cubic feet (ccf) for first	6	ccf
	1.12	/ccf up to	40	ccf
	1.20	/ccf up to	60	ccf
	1.32	/ccf for all higher ccfs		
Construction Service	0.60	/ccf		

(See Tables 1 & 2 for more information)

The last commodity rate increase was 1994 : the next increase is anticipated for 2005

The last rate restructuring was 1992 : the next restructuring is anticipated for 2005

- Please note: There was no increase/restructuring in 2004.

Tustin does not provide for an automatic commodity adjustment when the cost of supply changes.

Residential Fixed Charge or Customer Charge

Meter Size	Charge	Meter Size	Charge
1/2"	$ 16.00	3"	240.00
5/8"	16.00	4"	400.00
3/4"	16.00	5"	---
1"	40.00	6"	800.00
1 1/2"	80.00	8"	---
2"	128.00	10"	---

5.6.2 Cost of Water

In order to determine the cost-effectiveness of the Best Management Practices to be applied to reduce Non-revenue water in a distribution system, it is important to know the current cost of water, and, more importantly, the current production unit cost of supply. The current production unit cost of supply of water is calculated as:

$$\frac{\text{Total Amount Spent on Production of Water}}{\text{Total number of Units}}$$

The Financial Information for the City of Tustin for FY 2005 is given in Table 5-5. The total cost of production of water calculated from Table 5-5 is $ 5,326,473 (Expense categories: Source of Supply, Pumping, and Treatment). Total volume of water supplied to the water distribution system including the imported water is 4,303.2 million gallons. Thus, the current unit cost of producing 1 million gallons of water supply is calculated to be $ 1,237.80. At the time of reporting, the total water supplied for 2004-2005 was thought to be the treated water supplied to the distribution system and, thus, the retail water customers. Based on a more-thorough review of data sources provided by the City, the 4,303.2 million gallons may include the volume of water produced through desalters. Excluding this water would reduce the total water supplied to the distribution system and reduce the calculated water loss. Follow up audits for a subsequent fiscal year should confirm or dispute this potential conclusion.

Table 5-5: Financial Information for the City of Tustin for FY 2005

CITY OF TUSTIN

Financial Information

Source of Funds 2004-05		
	Amount	**Percent**
Collected from Rate Payers (monthly or bi-monthly water bills)	8,338,531	93%
Other Operating Revenues	139,588	2%
Investment Income	313,077	4%
Property Taxes	-0-	0%
Other	114,023	1%
Total Source of Funds	**$8,905,219**	**100%**

Use of Funds 2004-05		
	Amount	**Percent**
Source of Supply: RA, Met	3,404,794	37%
Pumping: Wells & booster pump stas.	1,193,711	13%
Treatment	727,968	8%
Transmission & Distribution	1,252,575	13%
Customer Accounts	88,998	1%
Administrative	366,555	4%
Principal & Interest (all obligations)	811,793	9%
Capital Improvements funded by non-debt	317,711	3
Other	242,254	3%
Transfers to City General Fund	849,953	9%
Total Use of Funds	**$9,256,312**	**100%**
Net Source and Use of Funds	**($351,093)**	

5.6.3 Review of the Audit Results

Malcolm Pirnie staff has utilized water supply and usage data provided by the City of Tustin and MWDOC for FY 2005 to populate the reporting sheet of the AWWA WLCC Water Audit Spreadsheet Software. The resultant calculations are indicated in Table 5-6. Based on the data entered into the spreadsheet, the software calculates and generates output in the form of performance indicators, which are shown in the lower portion of Table 5-6. The AWWA calculations of Performance Indicators include leakage allowances based upon the total length of water mains, number of customer service connections, length of service connection piping between the curb stop or property line and the customer meter, and average system pressure applied in all pressure zones. All of these system parameters are key factors in estimating the rate of real losses (active leakage) in the water distribution system.

Meter accuracy tests were performed at three flows (low flow, medium flow, and high flow) on ten residential water meters, which were pulled from the field by City of Tustin staff. Based on the accuracy results, calculated water loss incurred by the City of Tustin due to under registration of residential water meters (customer metering inaccuracy) was 72 million gallons for FY 2004-2005 indicated in Table 5-6 as apparent losses due to customer metering inaccuracies, based on extrapolation of residential meter accuracy tests. The details of these accuracy tests, results, and analysis are provided in Section 6.

Consistent with the software, the total non-revenue water for City of Tustin for Fiscal Year 2005 is calculated to be 472.3 million gallons (water losses: unbilled plus unmetered water use), which is 11% of the total water supplied to the City of Tustin's water distribution system.

Table 5-6: Data reporting interface of AWWA water audit spreadsheet for the City of Tustin

AWWA WLCC Water Audit Software: Reporting Worksheet — Back to Instructions

Click to access definition

Water Audit Report for: City of Tustin
Reporting Year: 2005

Please enter data in the white cells below. Where possible, metered values should be used; if metered values are unavailable please estimate a value. Indicate this by selecting a choice from the gray box to the left, where M = measured (or accurately known value) and E = estimated.

ALL VOLUMES TO BE ENTERED AS ANNUAL QUANTITIES

WATER SUPPLIED				
Volume from own sources:		M	3,153.4	million gallons (US) per year
Master meter error adjustment:				under-registered million gallons (US) per year
Water Imported:		M	1,149.7	million gallons (US) per year
Water Exported:				million gallons (US) per year
WATER SUPPLIED:			4,303.2	million gallons (US) per year
AUTHORIZED CONSUMPTION				
Billed metered:		M	3,830.8	million gallons (US) per year
Billed unmetered:				million gallons (US) per year
Unbilled metered:				million gallons (US) per year
Unbilled unmetered:		E	152.4	million gallons (US) per year
AUTHORIZED CONSUMPTION:			3,983.2	million gallons (US) per year
WATER LOSSES (Water Supplied - Authorized Consumption)			319.9	million gallons (US) per year
Apparent Losses				
Unauthorized consumption:				million gallons (US) per year
Customer metering inaccuracies:		E	72.0	million gallons (US) per year
Data handling errors:				million gallons (US) per year
Apparent Losses:			72.0	million gallons (US) per year
Real Losses				
Real Losses (Water Losses - Apparent Losses):			247.9	million gallons (US) per year
WATER LOSSES:			319.9	million gallons (US) per year
NON REVENUE WATER				
NON-REVENUE WATER:			472.3	million gallons (US) per year
SYSTEM DATA				
Length of mains:		M	172.0	miles
Number of active AND inactive service connections:		M	14,048	
Connection density:			82	conn./mile main
Average length of private pipe:			0.0	ft (pipe length between curbstop and customer meter or property)
Average operating pressure:		M	60.0	psi
COST DATA				
Total annual cost of operating water system:		M	$9,256,312	$/Year
Customer retail unit cost (applied to apparent losses):		M	$1.86	$/1000 gallons (US)
Variable production cost (applied to real losses):			$1,237.80	$/million gallons (US)

DATA REVIEW - Please review the following information and make changes above if necessary:

- Input values should be indicated as either measured or estimated. You have entered:
  - 8 as measured values
  - 2 as estimated values
  - 8 without specifying measured or estimated
- It is important to accurately measure the master meter - you have entered the measurement type as: measured
- Cost Data: No problems identified

PERFORMANCE INDICATORS

Financial Indicators

Non-revenue water as percent by volume:	11.0%
Non-revenue water as percent by cost:	6.8%
Annual cost of Apparent Losses:	$133,939
Annual cost of Real Losses:	$306,842

Operational Efficiency Indicators

Apparent losses per service connection per day:	14.04	gallons/connection/day
Real losses per service connection per day*:	48.35	gallons/connection/day
Real losses per length of main per day*:	N/A	
Real losses per service connection per day per psi pressure:	0.81	gallons/connection/day/psi
Unavoidable Annual Real Losses (UARL):	0.16	million gallons/day
Infrastructure Leakage Index (ILI) [Real Losses/UARL]:	3.73	

* only the most applicable of these two indicators will be calculated

The total annual value of real losses to the City of Tustin water distribution system for FY 2005 is $ 306,842, and the total annual value of apparent losses is $ 133,939.

One of the performance indicators calculated in the software for the distribution system is the Infrastructure Leakage Index (ILI). Infrastructure Leakage Index is defined as a ratio of the Current Annual Real Losses to the Unavoidable Annual Real Losses (UARL). For the City of Tustin, the value of ILI is calculated in the spreadsheet software to be 3.73, which falls in the middle target range specified by AWWA/IWA guidance, given in Table 5-8. If water resources for the City become more costly or scarce, it may be cost-effective for the City to reduce its ILI to below 3.0 through further reduction of its real water losses.

Table 5-7: Water balance – Calculations based on the information provided in reporting spreadsheet

AWWA WLCC Water Audit Software: Water Balance				Water Audit Report For: City of Tustin	Report Yr: 2005
Own Sources (Adjusted for known errors) 3,153.4	Water Exported 0.0	Billed Water Exported			
	Water Supplied 4,303.2	Authorized Consumption 3,983.2	Billed Authorized Consumption 3,830.8	Billed Metered Consumption (inc. water exported) 3,830.8	Revenue Water 3,830.8
				Billed Unmetered Consumption 0.0	
			Unbilled Authorized Consumption 152.4	Unbilled Metered Consumption 0.0	Non-Revenue Water (NRW) 472.3
				Unbilled Unmetered Consumption 152.4	
		Water Losses 319.9	Apparent Losses 72.0	Unauthorized Consumption 0.0	
				Customer Metering Inaccuracies 72.0	
				Data Handling Errors 0.0	
Water Imported 1,149.7			Real Losses 247.9	Leakage on Transmission and/or Distribution Mains Not broken down	
				Leakage and Overflows at Utility's Storage Tanks Not broken down	
				Leakage on Service Connections Not broken down	

Table 5-8: Guidance on Target Infrastructure Leakage Index (ILI)

TARGET ILI RANGE	*WATER RESOURCES CONSIDERATIONS*	*OPERATIONAL CONSIDERATIONS*	*FINANCIAL CONSIDERATIONS*
1.0 - 3.0	Available resources are very limited and/or environmentally unsound to develop	Leakage above this level requires expansion to existing infrastructure and/or new water resources	Water resources are costly to develop or purchase; ability to raise revenue(rates) is limited
3.0 - 5.0	It is believed that sufficient water resources are available for long term needs, using good leakage control	Existing water supply infrastructure capability is sufficient to meet long-term demand, with good leakage control	Water Resources can be developed or purchased at reasonable expense; rates can be increased
5.0 - 8.0	Water resources are plentiful, reliable and easily extracted	Superior reliability, capacity and integrity of infrastructure	Low water purchase cost; customer affordability is not the issue

6.0 Retail Member Agency Field Data Collection

6.1 Introduction

Task 6 of Malcolm Pirnie's contract Scope of Work, Retail Member Agency Field Data Collection, was accomplished through the combined efforts of the Mesa Consolidated Water District, MWDOC, City of Tustin staff, and Malcolm Pirnie, Inc. The objectives of this task were as follows:

- To obtain residential demand information for ten representative single-family homes for analysis.
- To perform accuracy tests on ten water meters pulled from the field.
- Incorporate the results of these field data collection activities into the AWWA water audit software.

This Task was conducted simultaneously with Task 5.

6.2 Residential Water Use Distribution

The Mesa Consolidated Water District installed ten Meter Master Data Loggers on ten typical single-family residential homes within the City of Tustin to study the water consumption pattern for a seven-day period. The major intent of conducting this field data collection activity was to obtain the percentage of the total weekly water use for each residential meter (5/8 by 3/4 – inch) that is in the low flow range (0 – 0.25 gpm), medium flow range (0.25 – 2.0 gpm), and high flow range (greater than 2.0 gpm). Residences were selected on the basis of having relatively new water meters and representative of typical water service in the City of Tustin. Residential flow reports were generated for these homes based on the flow data recorded by the Meter Master Data Loggers. For analyzing the data, flow reports consisting of Cumulative Volume,

Maximum Volume, Maximum Flow Rate, Average Flow Rate, and Minimum Flow Rate were provided to the Consultant Team. The results of flow reports are included as Appendix D to this Report.

Results for one of the ten meters were discarded, since this meter size was larger than 5/8 by 3/4-inch.

Table 6-1 provides the percentage of individual single-family residential cumulative flow volume passing through the 5/8 by 3/4-inch meters at low, medium and high flows. The graphical representation of this data has been provided in Figure 6-1.

Table 6-1: Percentage of Residential Cumulative flow Volume at Low, Medium, and High Flows

City of Tustin						
Percentage of Cumulative Residential Flow Measured for one week						
Meter Location	Meter Size	Percentage of Flow Volume				Total Percentage of Flow
		Low Flow	Med Flow	High Flow		
		0 - 0.25 gpm	0.25 - 2.0 gpm	2.0 - 15.0 + gpm		
1	Model 25	4.82%	7.51%	87.67%		100.00%
2	Model 25	4.60%	11.72%	83.68%		100.00%
3	Model 25	14.29%	46.22%	39.49%		100.00%
4	Model 25	4.33%	8.99%	86.68%		100.00%
5	Model 25	3.74%	5.59%	90.67%		100.00%
6	Model 25	2.25%	10.95%	86.81%		100.00%
7	Model 25	7.72%	4.48%	87.81%		100.00%
8	Model 25	4.09%	9.38%	86.53%		100.00%
9	Model 25	0.84%	2.75%	96.41%		100.00%
Average		5.19%	11.95%	82.86%		100.00%

Table 6-1 shows that, on an average, 5.19 percent of the total weekly measured flow was used at the low flow range, 11.95 percent was used at the medium flow range, and 82.86 percent was used at the high flow range. Based on these water usage figures, it can be concluded that about 95 percent of the consumption is at the medium and high flow rates, for which small residential water meters typically have a higher accuracy.

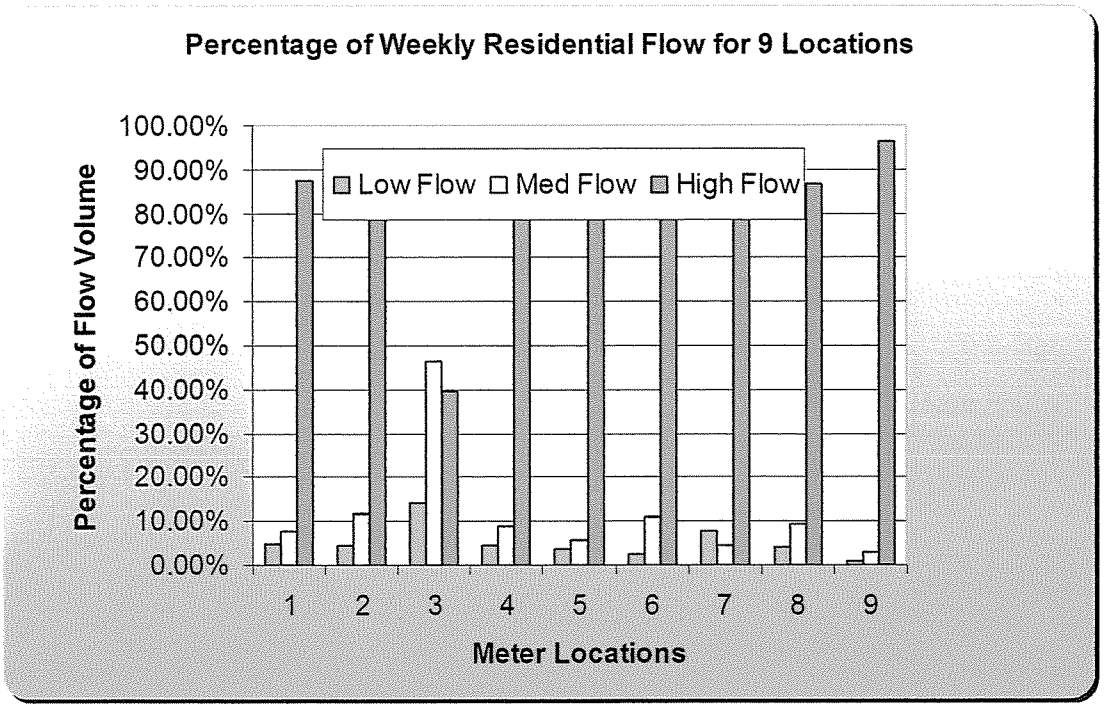


Figure 6-1: Graphical presentation of Percentage of Residential Flow Volume at Low, Medium, and High Flows

6.3 Meter Accuracy Tests

Ten single-family residential water meters were pulled from the field by City of Tustin staff, upon which the accuracy tests were performed by Measurement Control Systems. These residential water meters were selected from the active Tustin water distribution system on the basis of total in-service cumulative flow of 1-3 million gallons. Typically, this could mean a service of 6 to 20 years depending upon per service water use.

The results of accuracy tests at low, medium, and high flow ranges for the ten 5/8 by ¾-inch domestic residential water meters were then provided to the Consultant Team for analysis. The results of accuracy tests conducted by Measurement Control Systems are provided in Appendix E at the end of this Report. Table 6-2 shows the calculated meter accuracies expressed as a percentage at three different flow rates.

Table 6-2: Results of Meter Accuracy Tests at Three Different Flow Rates

City of Tustin				
Meter Accuracy at three different Flow Rates				
Sample Meter No.	Cumulative Flow Registered by meter (Gallons)	Meter Accuracy (Low Flow - 0.26 GPM)	Meter Accuracy (Medium Flow - 2.10 GPM)	Meter Accuracy (High Flow - 15 GPM)
1	3,153,568	96.96%	101.0200%	99.7900%
2	1,271,600	95.500%	75.1800%	98.9700%
3	1,279,828	99.010%	99.8600%	98.7800%
4	1,501,984	99.860%	99.4900%	98.7800%
5	2,454,188	98.740%	98.7400%	97.3200%
6	2,579,852	95.750%	99.1200%	98.3700%
7	2,324,784	70.450%	91.6400%	93.8100%
8	1,242,428	71.060%	93.8800%	91.9700%
9	1,146,684	77.050%	94.6300%	94.5200%
10	2,367,420	92.960%	98.3700%	97.9900%
Average	**1,932,234**	89.73%	95.1930%	97.0300%

Data plots of the meter accuracy versus cumulative flow for each of the low, medium, and high flow test rates are indicated in Figure 6-2, Figure 6-3, and Figure 6-4, respectively. On each graph, a trend line indicating the best linear data, fit calculated by Microsoft Excel is also indicated. The slope of the trend line in each figure clearly indicates that the meter accuracy for a specific flow range decreases with an increase in the cumulative flow volume measured by the meters.

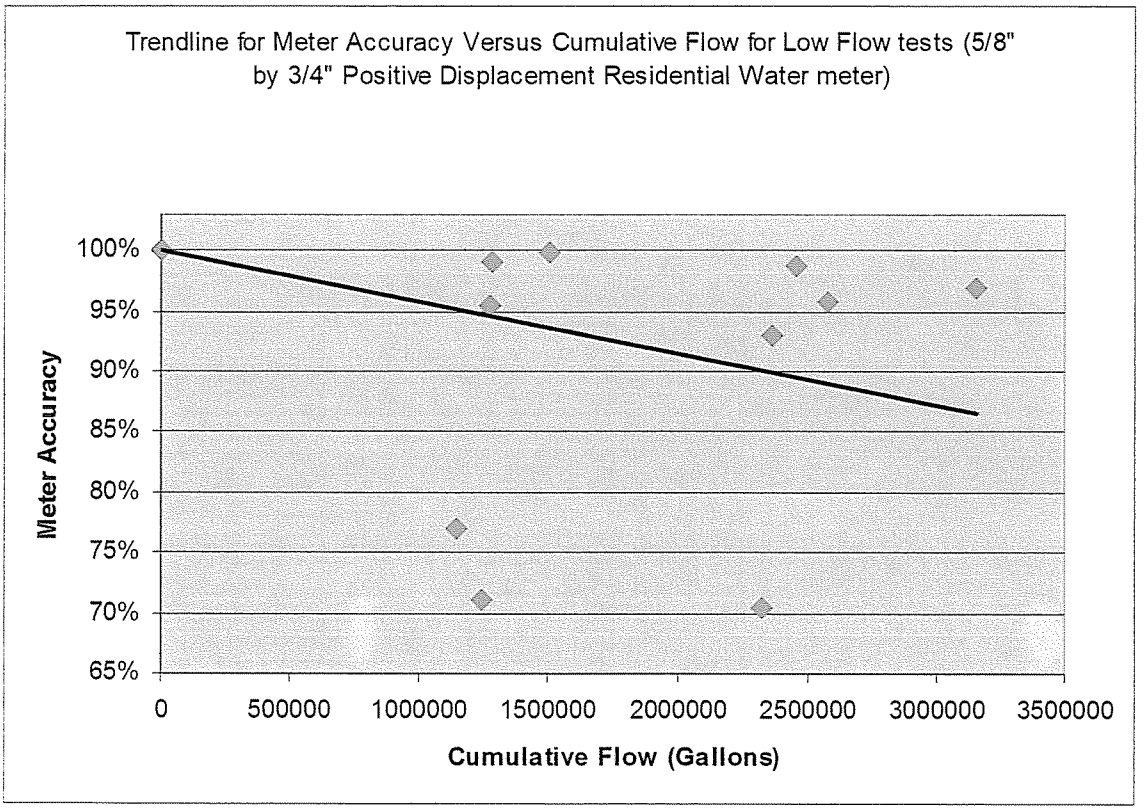


Figure 6-2: Meter Accuracy versus Cumulative Flow for Low Flow tests (5/8" by 3/4" Positive Displacement Residential Water Meters)

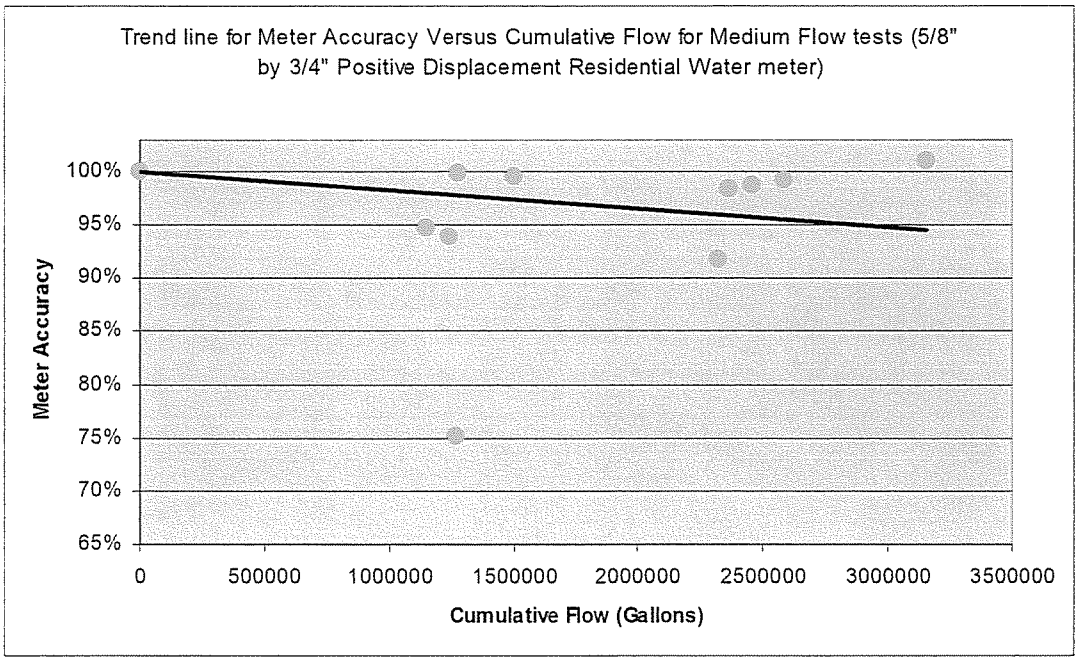


Figure 6-3: Meter Accuracy versus Cumulative Flow for Medium Flow tests (5/8" by 3/4" Positive Displacement Residential Water Meters)

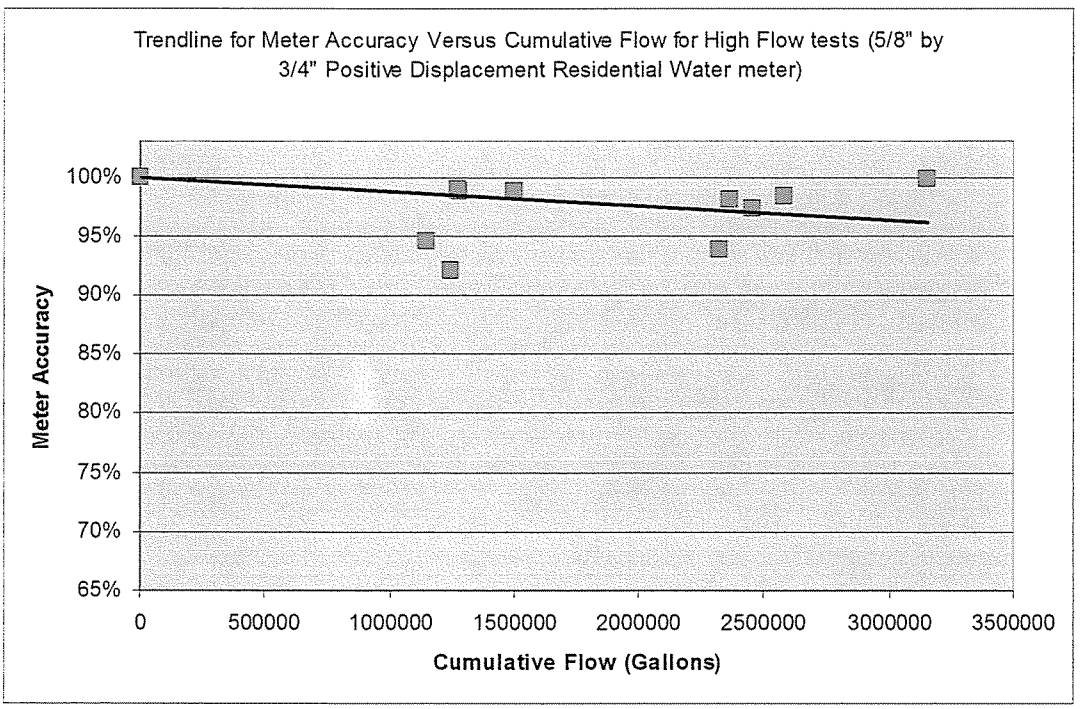


Figure 6-4: Meter Accuracy versus Cumulative Flow for High Flow tests (5/8" by 3/4" Positive Displacement Residential Water Meters)

Average age of the water meters in the Tustin water distribution system is stated as ten years in the questionnaire. The volume of water passing through a meter and its corresponding service life are key determinants of its accuracy. Using the average residential water usage, the total average residential amount of water consumed in ten years per meter was calculated to be 1,533,201 gallons. The average accuracies at this cumulative flow volume were calculated from the trend lines for the low, medium, and high flow test ranges as shown in Figure 6-5. The average annual weighted average for the percentage of time the average residential customer uses water at low, medium and high flow rates was used to calculate the average Tustin-specific percentage of under-registration of the water meters. In this case, the weighted average of the accuracy of residential water meters is 98.12 percent or 1.88 percent, under-registration. This percentage of meter under-registration is low for a typical water utility. These results were used to estimate Tustin's apparent water losses due to meter inaccuracy in the AWWA Water Audit Spreadsheet discussed in the previous chapter. Based on this limited data set, this study concludes that the majority of Tustin's water losses are coming from water system leakage, defined as "Real Losses" in the water audit software.

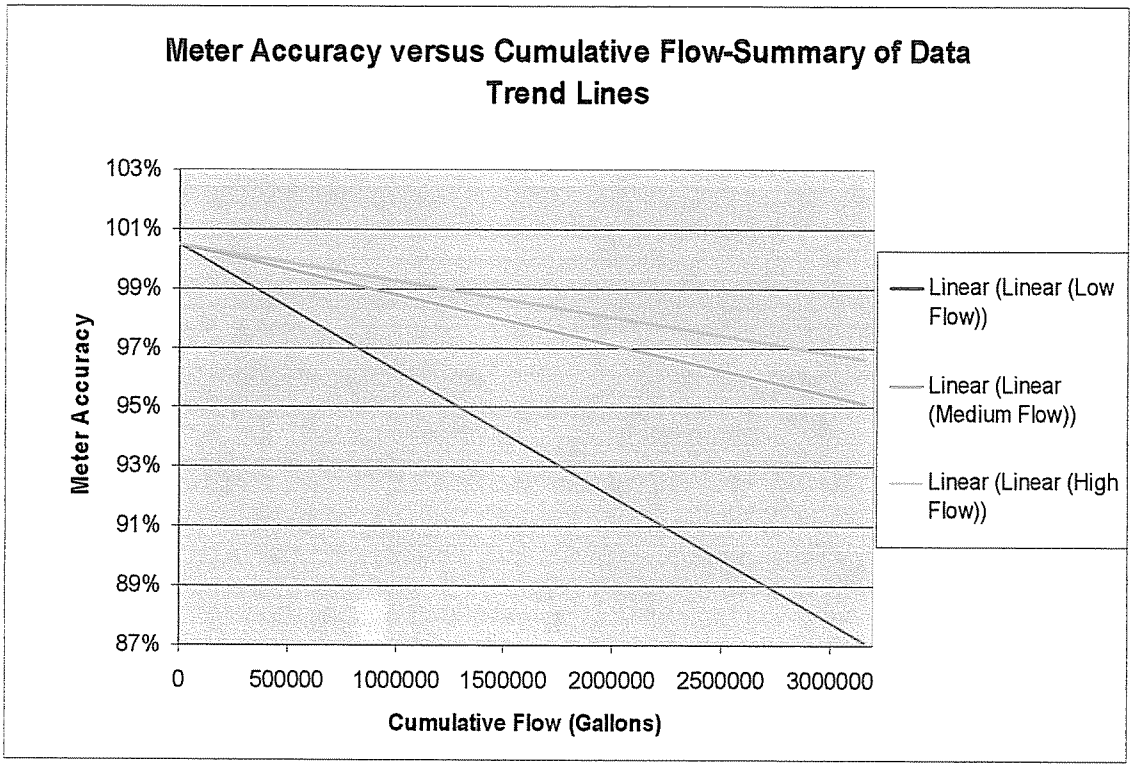


Figure 6-5: Meter Accuracy versus Cumulative Flow-Summary of Data Trend Lines

7.0 Findings, Conclusions, and Recommendations

This section of the MWDOC Water Loss Management Program Assessment Report presents the findings, conclusions, and recommendations of the study. The findings of the jointly funded study are based on the limited available project funding provided by the U.S. Bureau of Reclamation Southern California Area Office under its Water Conservation Field Services Grants program and MWDOC ($50,000), results of a member-agency utility questionnaire, and a demonstration water audit for the City of Tustin. The demonstration water audit used public domain software available from the American Water Works Association and developed by their Water Loss Control Committee.

7.1 Study Findings

The following are major findings of the MWDOC Water Loss Management Program Assessment Project:

- ten of 29 MWDOC retail member agencies responded to a 94-question survey prepared in Microsoft Excel spreadsheet format.
- it took about six weeks for 35 percent of retail agencies to respond to the questionnaire.
- utility population for the ten reporting utilities varies from 3,000 to 200,000.
- service connections for reporting utilities varies from 1,200 to 53,000.
- reported water loss varies from 2 percent of supply to almost 20 percent.
- in many cases, questionnaire information was not consistent with data reported in MWDOC's Orange County Water Rates Survey.
- percent of MWDOC supply varied from 16 to 100.

- average static pressure in utility distribution systems varied from 60 to 100 psi.
- residential meter replacement varied from 10 to 20 years.
- four of the ten reporting agencies conduct annual water audits.
- reported sources of water loss were leaks, flushing, reservoirs, and water meters.
- half of the reporting agencies use some method of active leak detection.
- Follow-up telephone interviews took from a few minutes to an hour, depending on knowledge and interest of staff. Many contacted felt their water loss monitoring programs were excellent and effective.
- the City of Tustin was very interested in the details of the project and recognized the value in performing the demonstration audit. Based on Tustin's interest and reported water loss, they were selected for audit.
- the MWDOC 2005 Urban Water Management Plan has a goal of identifying water use efficiency measures that can be accomplished in a cost-effective manner.
- this report responds to Best Management Practice (BMP) No. 3 in the CUWCC Memorandum of Understanding relating to water conservation.
- the "unaccounted-for-water" average for Orange County water agencies was 5.1 percent as reported in the MWDOC "Orange County Water Agencies Water Rates, Water System Operations, and Financial Information" report for 2005.
- the Metropolitan MWD-Main model predicts water losses at 7.4 percent of supply.
- the Tustin 2005 Urban Water Management Plan forecasts Tustin water loss at 11.3 percent of supply or 1,330 acre-feet per year.

- the AWWA/IWA water audit software identifies two water loss categories as real water losses and apparent water losses.
- there are four different methods of managing each type of real and apparent water losses.
- the AWWA/IWA water audit for Tustin for fiscal year 2004-2005 indicated the following:

  -total water supplied was 4,303.2 MG

  -non-revenue water was 472.3 MG

  -water loss was 11.0 percent

  -annual cost of real losses = $306,842

  -annual cost of apparent losses = $133,939

  -Infrastructure Leakage Index = 3.73
- field data collection for one week in September on sample residential water meters in Tustin indicated 5.19% of total use was at low flow, 11.95% at medium flow, and 82.86% at high flow.
- ten residential meter accuracy tests were performed by Measurement Control Systems on meters having in-service cumulative flow of 1-3 million gallons. AWWA recommends a minimum of 70 water meter accuracy tests to be statistically significant, but results more typical of a much larger database.
- average meter accuracy was 89.7% for low flow, 95.2% for medium flow, and 97.0% for high flow.
- the weighted meter accuracy for Tustin residential meters was 98.12 percent, reflecting an average under-registration of 1.88 percent.

7.2 Conclusions

Based on the above primary findings, the following can be concluded from this study:

- the level of water loss in MWDOC retail water agencies varies significantly, and reported losses aren't consistent among report references.
- there is significant staff and consultant effort required to collect, organize, and format water supply and demand information for an AWWA/IWA water audit.
- Urban Water Management Plans are excellent sources of information about historical and projected water supplies and demands.
- the CUWCC BMP No. 3 on System Water Audit, Leak Detection, and Repair applies most to this report on MWDOC water loss management.
- MWDOC projected population and water demand growth requires continued focus on water conservation and water use efficiency.
- with existing and projected MWDOC member agency water losses at 40,000 acre-feet per year, there is substantial room for water-use efficiency by member agencies.
- the new AWWA/IWA water audit methodology and spreadsheet software provide an excellent tool for assessing a utility's water balance and potential value of water saved through loss management.

- Tustin's 2004-2005 water audit showed that there is a potential for saving water and money by additional identifying and reducing real water losses through system leak detection, location, and repair.
- field data collection of residential time-of-day water use indicated only 5.2 percent at low flow. This result was surprisingly low to the Consultant Team.
- Meter accuracy testing for Tustin residential water meters indicated excellent service after 1-3 million gallons of cumulative flow.
- Plots of meter accuracy versus cumulative flow were consistent with results from other western U.S. utilities showing reduced accuracy at low flow with increased cumulative volume through the meter.

7.3 Recommendations

Based on the foregoing findings and conclusions of this assessment of MWDOC's Water Loss Management Program, the following are recommendations for further consideration by MWDOC and its member retail water agencies:

1. MWDOC should enhance the accuracy of audit work for the City of Tustin by conducting additional field investigations on calibration and validity testing of water supply meters and on leak detection surveys.
2. Water audits in the AWWA/IWA spreadsheet software format should be prepared for additional MWDOC retail member agencies to characterize water loss issues throughout its service area.

3. Additional grant applications to the U.S. Bureau of Reclamation and the California Department of Water Resources should be prepared and submitted in pursuit of follow-up funding of water audit work.

4. The City of Tustin Water Services Division should investigate the feasibility and cost-effectiveness of enhancing its pro-active leak detection activities and repair response time.

5. Results of this study should be shared with the CUWCC to advocate the extended application of the AWWA/IWA Water Audit methodology to other signatories to the MOU.

6. MWDOC retail member agencies and other California conservation-conscious water utilities should begin collecting and organizing the necessary water supply and customer demand information to conduct a standard annual water audit using AWWA/IWA methodology and to perform periodic updates.

7. Upon collection of multiple utility audits, a database should be developed to compare audit results, utility standard performance indicators, and water loss reduction methodologies and successes.

APPENDIX A

Completed Utility Questionnaires

1- Utility Information

Back to TOC

Question Number		Response (*Please fill in the following cells*)
1	Water Agency Name	City of San Clemente
2	Address	380 Ave Pico, Building N
3	City	San Clemente
4	State	California
5	Zip Code	92672
6	Country	USA
7	General Phone Number	(949) 366-1553
8	Water Agency Homepage	www.ci.san-clemente.ca.us
9	Ownership (public or private)	Public
10	Manager/Director: Last Name	Lund
	10a First Name	David
	10b Phone Number	(949) 361-8391
	10c Email Address	Lundd@san-clemente.org
11	Water Use Efficiency Point of Contact: Last Name	Clatfelter
	11a First Name	Elizabeth
	11b Phone Number	(949) 361-8354
	11c Email Address	clatfeltere@san-clemente.org
12	Utility Operations Point of Contact: Last Name	Howard
	12a First Name	A.J.
	12b Phone Number	(949) 361-8253
	12c Email Address	howarda@san-clemente.org
13	Number of Supply Sources	2
14	Population Served	43,900
15	Service Area in Square Miles (mi^2)	14.7
16	Total Number of Connections/ Customers	17,070
17	Total Number of Retail Connections	845 (commercial accounts)
18	Average Annual Water Volume Delivered to Customers (AF/yr)	11,341
	18a Supply Capacity (AF/yr)	17,222
	18b Percent Imported (MWDOC) Water Supply (%)	94
	18c Percent Surface Water Supply (%)	0
	18d Percent Potable Groundwater Supply (%)	5
	18e Percent Colored Groundwater Supply (%)	0
19	Most Recent Water Department ISO Rating	X
20	Most Recent Fire Department ISO Rating	X
21	Number of Fire Hydrants	2224
22	Service Area Elevation Range (ft)	10 to 807
23	Total Number of Pressure Zones in Service Area	14 w/average 2 subzones in each zone
24	Approximate Elevation Range in each Pressure Zone (ft)	160
25	Average Number of Customer Connections per Pressure Zone	1286
26	Average Static Pressure Delivered to Pressure Zones (PSI)	70

1- Utility Information

Back to TOC

Question Number		Response (*Please fill in the following cells*)
1	Water Agency Name	City of Newport Beach
2	Address	3300 Newport Boulevard
3	City	Newport Beach
4	State	California
5	Zip Code	92663
6	Country	USA
7	General Phone Number	(949) 644-3309
8	Water Agency Homepage	www.city.newport-beach.ca.us
9	Ownership	
10	Manager/Director: Last Name	Bludau
	10a First Name	Homer
	10b Phone Number	(949) 644-3000
	10c Email Address	
11	Water Use Efficiency Point of Contact: Last Name	Moritz
	11a First Name	Teresa
	11b Phone Number	(949) 644-3013
	11c Email Address	tmoritz@city.newport-beach.ca.us
12	Utility Operations Point of Contact: Last Name	Deutsch
	12a First Name	Tim
	12b Phone Number	(949) 644-3010
	12c Email Address	
13	Number of Supply Sources	
14	Population Served	76,382
15	Service Area in Square Miles (mi^2)	
16	Total Number of Connections/ Customers	26,361
17	Total Number of Retail Connections	
18	Average Annual Water Volume Delivered to Customers (AF/yr)	17,075
	18a Supply Capacity (AF/yr)	
	18b Percent Imported (MWDOC) Water Supply (%)	34
	18c Percent Surface Water Supply (%)	
	18d Percent Potable Groundwater Supply (%)	66
	18e Percent Colored Groundwater Supply (%)	
19	Most Recent Water Department ISO Rating	
20	Most Recent Fire Department ISO Rating	
21	Number of Fire Hydrants	
22	Service Area Elevation Range (ft)	
23	Total Number of Pressure Zones in Service Area	
24	Approximate Elevation Range in each Pressure Zone (ft)	
25	Average Number of Customer Connections per Pressure Zone	
26	Average Static Pressure Delivered to Pressure Zones (PSI)	

4- Water Supply Auditing

Back to TOC

Question Number		Response (*Please fill in the following cells*)
53	Do you currently compile a potable water supply audit on a regular basis? (Yes or No)	Yes
	53a If **Yes**, at what frequency? (Monthly, Annually, Semi-Annually, Every five years, etc)	Annually
54	What is the approximate cost to purchase each AF of MWDOC water that is placed into the distribution system? ($/AF)	481.50
55	What is the approximate cost to collect, treat, and deliver each AF of other surface water that is placed into the distribution system? ($/AF)	N/A
56	What is the approximate cost to produce each AF of potable groundwater that is placed into the distribution system? ($/AF)	N/A
57	What is the approximate cost to produce each AF of colored groundwater that is placed into the distribution system? ($/AF)	N/A
58	What is the approximate average residential rate charged to customers per CCF of billed usage? ($/CCF)	91
59	What is the approximate average ICI rate charged to customers per CCF of billed usage? ($)	N/A
60	Has your system experienced supply constraints for meeting peak demands (withdrawal restrictions, system capacity limitations or other conditions, excluding drought) (Yes or No)?	No
61	Is the water input to the distribution system metered? (Yes or No)	Yes
	61a If **Yes**, how often are input meters tested (yrs)?	N/A
	61b If **Yes**, list approximate composite input meter error for all meters (%):	N/A
	61c If **Yes**, what is the nature of the composite input meter error?	N/A

Question Number	Please provide all the following water supply audit data for your most recent year.	Calculated	Response (*Please fill in the following cells*)
62	Water volume input to distribution (produced and purchased) (AF)		39,884
63	Billed authorized consumption volume (CCF)		36,415
64	Unbilled authorized consumption volume (internal uses: flushing, cleaning, irrigation, etc) (CCF)		1,799
65	Total authorized consumption volume (sum of **63** and **64**) (CCF)		38,214
66	Water losses (water volume input to distribution in question **62** minus total authorized consumption in question **65** converted to AF) (AF)		1670
67	List approximate percentage of water losses believed to exist as apparent losses (%)		4.2%
68	Volume of apparent losses (water losses in question **66** multiplied by the percentage of apparent losses in question **67**) (AF)	0	69.93
69	List what you believe to be the greatest source of apparent losses.		Meters
70	List approximate percentage of water losses believed to exist as real losses (%)		4.5%
71	Volume of real losses (water losses in question **66** multiplied by the percentage of real losses in question **70**) (AF)	0	75.33
72	List what you believe to be the greatest source of real losses.		Line Breaks
73	Calculated water volume input to distribution (sum of total authorized consumption in question **65** converted to AF, and water losses in question **66**) (AF)	0	39,884

5- Leakage Management

Back to TOC

Question Number		Response (*Please fill in the following cells*)
74	Number of main breaks per year.	5
75	Annual expenditures on break repairs ($/yr).	x
76	Average hours out-of-service per break (time customers are out of water service) (hrs).	2
77	Annual number of reported customer service line leaks - water main to curb stop box.	5
78	Annual number of reported customer service line leaks - curb stop box to customer meter (or premises if no meter).	5
79	Annual number of leak repairs on customer service lines - water main to curb stop box.	5
80	Annual number of leak repairs on customer service lines - curb stop box to customer meter (or premises if no meter).	5
81	Annual number of leak repairs on water mains.	5
82	Annual number of leak repairs on fire hydrants, valves and other appurtenances.	3
83	Annual expenditures on all leak repairs ($/yr).	x
84	Does your utility have a water loss reduction target? (Yes or No)	No
	84a If **Yes**, please describe.	x
85	Does any state or other agency require you to address water losses and loss reduction? (Yes or No)	No
	85a If **Yes**, please describe.	x
86	Annual expenditure for all other leakage management activities ($/yr). See **NOTE** below for details.	$500,000 Pipeline Repl.

NOTE for Question 86:

The annual expenditure for all leakage management activities EXCEPT for repair (question **83**). These costs will include

1 Sonic leak detection (including leak noise loggers)
2 Leak correlator pinpointing
3 District metered area nightflow measurements
4 Installation and operation of pressure control equipment
5 Other techniques to measure or control leakage

Please answer Yes to all leak detection and location survey methods used regularly, and No to methods not used.

Question Number		Yes or No
87	Passive Only (Only locate/repair reported visible leaks)	Yes
88	Listening Sticks	Yes
89	Ground Microphones	No
90	Noise Loggers	No
91	District Metered Areas	No
92	Leak Noise Correlation	Yes
93	Is water pressure regulated at various times during the day strictly as a means of leakage reduction?	No

Question Number		Response (*Please fill in the following cells*)
94	How often are the leak detection methods asked in questions **87** to **93** used?	10 Times/year

5- Leakage Management

Back to TOC

Question Number		Response (*Please fill in the following cells*)
74	Number of main breaks per year.	25 (Average)
75	Annual expenditures on break repairs ($/yr).	$85K - $100K
76	Average hours out-of-service per break (time customers are out of water service) (hrs).	4 - 6 Hours
77	Annual number of reported customer service line leaks - water main to curb stop box.	127
78	Annual number of reported customer service line leaks - curb stop box to customer meter (or premises if no meter).	N/A
79	Annual number of leak repairs on customer service lines - water main to curb stop box.	127
80	Annual number of leak repairs on customer service lines - curb stop box to customer meter (or premises if no meter).	N/A
81	Annual number of leak repairs on water mains.	25 (Average)
82	Annual number of leak repairs on fire hydrants, valves and other appurtenances.	N/A
83	Annual expenditures on all leak repairs ($/yr).	$228,618
84	Does your utility have a water loss reduction target? (Yes or No)	YES
84a	If **Yes**, please describe.	under 10% based on AWWA standards
85	Does any state or other agency require you to address water losses and loss reduction? (Yes or No)	NO
85a	If **Yes**, please describe.	
86	Annual expenditure for all other leakage management activities ($/yr). See **NOTE** below for details.	N/A

NOTE for Question 86:

The annual expenditure for all leakage management activities EXCEPT for repair (question **83**). These costs will include

1 Sonic leak detection (including leak noise loggers)
2 Leak correlator pinpointing
3 District metered area nightflow measurements
4 Installation and operation of pressure control equipment
5 Other techniques to measure or control leakage

Please answer Yes to all leak detection and location survey methods used regularly, and No to methods not used.

Question Number		Yes or No
87	Passive Only (Only locate/repair reported visible leaks)	Yes
88	Listening Sticks	Yes
89	Ground Microphones	Yes
90	Noise Loggers	No
91	District Metered Areas	No
92	Leak Noise Correlation	No
93	Is water pressure regulated at various times during the day strictly as a means of leakage reduction?	No

Question Number		Response (*Please fill in the following cells*)
94	How often are the leak detection methods asked in questions **87** to **93** used?	As necessary

5- Leakage Management

Back to TOC

Question Number		Response (*Please fill in the following cells*)
74	Number of main breaks per year.	3 to 5
75	Annual expenditures on break repairs ($/yr).	N/A
76	Average hours out-of-service per break (time customers are out of water service) (hrs).	4 to 12
77	Annual number of reported customer service line leaks - water main to curb stop box.	45
78	Annual number of reported customer service line leaks - curb stop box to customer meter (or premises if no meter).	39
79	Annual number of leak repairs on customer service lines - water main to curb stop box.	45
80	Annual number of leak repairs on customer service lines - curb stop box to customer meter (or premises if no meter).	0 customer's responsibility
81	Annual number of leak repairs on water mains.	3 to 5
82	Annual number of leak repairs on fire hydrants, valves and other appurtenances.	3
83	Annual expenditures on all leak repairs ($/yr).	$67,554.00
84	Does your utility have a water loss reduction target? (Yes or No)	no
	84a If **Yes**, please describe.	
85	Does any state or other agency require you to address water losses and loss reduction? (Yes or No)	YES
	85a If **Yes**, please describe.	
86	Annual expenditure for all other leakage management activities ($/yr). See **NOTE** below for details.	None

NOTE for Question 86:

The annual expenditure for all leakage management activities EXCEPT for repair (question **83**). These costs will include

1 Sonic leak detection (including leak noise loggers)
2 Leak correlator pinpointing
3 District metered area nightflow measurements
4 Installation and operation of pressure control equipment
5 Other techniques to measure or control leakage

Please answer Yes to all leak detection and location survey methods used regularly, and No to methods not used.

Question Number		Yes or No
87	Passive Only (Only locate/repair reported visible leaks)	Yes
88	Listening Sticks	no
89	Ground Microphones	no
90	Noise Loggers	no
91	District Metered Areas	no
92	Leak Noise Correlation	no
93	Is water pressure regulated at various times during the day strictly as a means of leakage reduction?	no

Question Number		Response (*Please fill in the following cells*)
94	How often are the leak detection methods asked in questions **87** to **93** used?	0

2-Pipe Materials, Delivery Pressures, and Modeling

Back to TOC

Please enter the length in miles of each pipe material type.
If you do not keep an inventory of pipe materials, please estimate this number.

Question Number	Pipe Material Type	*Percent in Place (Calculated)*	*Miles**	
27	Asbestos Cement	50%	11.9	
28	Cast Iron (Unlined)	0%		
29	Cast Iron (Cement-Mortar Lined)	0%		
30	Concrete Pressure	0%		
31	Ductile Iron (Unlined)	12%	2.8	
32	Ductile Iron (Cement Mortar Lined)	0%		
33	Polyethylene	0%		
34	Polyvinyl Chloride (PVC)	15%	3.5	
35	Steel	22%	5.2	Description of "Other"
36	Other 1	0%		
37	Other 2	0%		
38	Other 3	0%		
	Total (*Calculated*)		23.4	

Question Number		*Response (Please fill in the following cells)*
39	Average static water pressure (PSI)	80
40	Low static water pressure (PSI)	28
41	High static water pressure (PSI)	130
42	Please list software used for water distribution system modeling	BoyleNet
43	When was your water distribution system model last updated? (approximate date)	1985
44	What planning horizon was used in your water distribution system model (20 yrs, 50 yrs, etc.)? (yrs)	30
45	Does your software for water distribution system modeling interface with a GIS? Yes or No	No
46	Does your billing system interface with a GIS? Yes or No	No

4- Water Supply Auditing

Back to TOC

Question Number		Response (*Please fill in the following cells*)
53	Do you currently compile a potable water supply audit on a regular basis? (Yes or No)	No
	53a If **Yes**, at what frequency? (Monthly, Annually, Semi-Annually, Every five years, etc)	
54	What is the approximate cost to purchase each AF of MWDOC water that is placed into the distribution system? ($/AF)	481.50
55	What is the approximate cost to collect, treat, and deliver each AF of other surface water that is placed into the distribution system? ($/AF)	N/A
56	What is the approximate cost to produce each AF of potable groundwater that is placed into the distribution system? ($/AF)	N/A
57	What is the approximate cost to produce each AF of colored groundwater that is placed into the distribution system? ($/AF)	N/A
58	What is the approximate average residential rate charged to customers per CCF of billed usage? ($/CCF)	1.80
59	What is the approximate average ICI rate charged to customers per CCF of billed usage? ($)	1.8
60	Has your system experienced supply constraints for meeting peak demands (withdrawal restrictions, system capacity limitations or other conditions, excluding drought) (Yes or No)?	No
61	Is the water input to the distribution system metered? (Yes or No)	Yes
	61a If **Yes**, how often are input meters tested (yrs)?	Once a year
	61b If **Yes**, list approximate composite input meter error for all meters (%):	5%
	61c If **Yes**, what is the nature of the composite input meter error?	wear

Question Number	Please provide all the following water supply audit data for your most recent year.	Calculated	Response (*Please fill in the following cells*)
62	Water volume input to distribution (produced and purchased) (AF)		11,070.17
63	Billed authorized consumption volume (CCF)		10,009
64	Unbilled authorized consumption volume (internal uses: flushing, cleaning, irrigation, etc)(CCF)		100
65	Total authorized consumption volume (sum of **63** and **64**) (CCF)		10,109
66	Water losses (water volume input to distribution in question **62** minus total authorized consumption in question **65** converted to AF) (AF)		961.17
67	List approximate percentage of water losses believed to exist as apparent losses (%)		4%
68	Volume of apparent losses (water losses in question **66** multiplied by the percentage of apparent losses in question **67**) (AF)	0	38.44
69	List what you believe to be the greatest source of apparent losses.		Leaks
70	List approximate percentage of water losses believed to exist as real losses (%)		4%
71	Volume of real losses (water losses in question **66** multiplied by the percentage of real losses in question **70**) (AF)	0	38.44
72	List what you believe to be the greatest source of real losses.		Leaks
73	Calculated water volume input to distribution (sum of total authorized consumption in question **65** converted to AF, and water losses in question **66**) (AF)	0	11,076

APPENDIX B

AWWA/IWA Spreadsheet Water Audit Software

AWWA WLCC Water Audit Software: Reporting Worksheet

Back to Instructions

Click to access definition

Water Audit Report for:

Reporting Year:

Please enter data in the white cells below. Where possible, metered values should be used; if metered values are unavailable please estimate a value. Indicate this by selecting a choice from the gray box to the left, where m = measured (or accurately known value) and e = estimated.

ALL VOLUMES TO BE ENTERED AS ANNUAL QUANTITIES

WATER SUPPLIED

Please choose reporting units from the instructions sheet

Volume from own sources:			
Master meter error adjustment:			under-registered
Water Imported:			
Water Exported:			
WATER SUPPLIED:		0.0	

AUTHORIZED CONSUMPTION

Billed metered:		
Billed unmetered:		
Unbilled metered:		
Unbilled unmetered:		
AUTHORIZED CONSUMPTION:	0.0	

WATER LOSSES (Water Supplied - Authorized Consumption) 0.0

Apparent Losses

Unauthorized consumption:		
Customer metering inaccuracies:		
Data handling errors:		
Apparent Losses:	0.0	

Real Losses

Real Losses (Water Losses - Apparent Losses):	0.0
WATER LOSSES:	0.0

NON_REVENUE WATER

NON-REVENUE WATER: 0.0

SYSTEM DATA

Length of mains:			
Number of active AND inactive service connections:			
Connection density:			
Average length of private pipe:		0.0	(pipe length between curbstop and customer meter or property
Average operating pressure:			

COST DATA

Total annual cost of operating water system:			$/Year
Customer retail unit cost (applied to apparent losses):			$/1000 gallons (US)
Variable production cost (applied to real losses):			

DATA REVIEW - Please review the following information and make changes above if necessary:

- Input values should be indicated as either measured or estimated. You have entered:
  - 0 as measured values
  - 0 as estimated values
  - 18 without specifying measured or estimated
- It is important to accurately measure the master meter - you have entered the measurement type as: unspecified

#N/A

PERFORMANCE INDICATORS

Financial Indicators

Non-revenue water as percent by volume:	
Non-revenue water as percent by cost:	
Annual cost of Apparent losses:	#N/A
Annual cost of Real Losses:	

Operational Efficiency Indicators

Apparent losses per service connection per day:	
Real losses per service connection per day*:	
Real losses per length of main per day*:	
Real losses per service connection per day per meter (head) pressure:	
Unavoidable Annual Real Losses (UARL):	
Infrastructure Leakage Index (ILI) [Real Losses/UARL]:	

* only the most applicable of these two indicators will be calculated

APPENDIX C

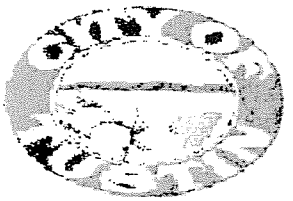
Water Meter Consumption Report
For the
City of Tustin

Utility Billing
Consumption by Meter Size

User: kunal
Printed: 09/13/2006 - 3:33 PM
Meter Status: All Meters
Period: 07
Year: 2004
From: Route 01 to Route 71
Conversion Type: No Conversion

Size	No of Accounts	Consumption
Meter size not specified.	3	0.00
A	9,938	226,215.00
A (I)	1	0.00
A (J)	1	0.00
B	2,952	148,659.00
C	354	36,141.00
D	569	128,520.00
E	38	20,806.00
F	56	20,173.00
G	100	9,346.00
I	31	45.00
1 INCH	1	0.00
J	2	4.00
K	1	0.00
L	1	0.00
Grand Totals:	14,048	589,909.00

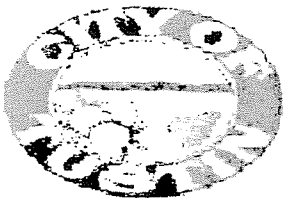
Utility Billing
Consumption by Meter Size



User: kunal
Printed: 09/13/2006 - 4:01 PM
Meter Status: All Meters
Period: 08
Year: 2004
From: Route 01 to Route 71
Conversion Type: No Conversion

Size	No of Accounts	Consumption
Meter size not specified.	3	0.00
A	9,938	255,768.00
A (I)	1	0.00
A (J)	1	0.00
B	2,952	130,978.00
C	354	19,447.00
D	569	123,573.00
E	38	14,255.00
F	56	18,773.00
G	100	18,770.00
I	31	0.00
I INCH	1	0.00
J	2	0.00
K	1	0.00
L	1	0.00
Grand Totals:	14,048	581,564.00

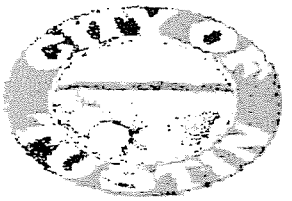
Utility Billing
Consumption by Meter Size



User: kunal
Printed: 09/13/2006 - 4:04 PM
Meter Status: All Meters
Period: 09
Year: 2004
From: Route 01 to Route 71
Conversion Type: No Conversion

Size	No of Accounts	Consumption
Meter size not specified.	3	0.00
A	9,938	224,002.00
A (I)	1	0.00
A (J)	1	0.00
B	2,952	146,595.00
C	354	34,518.00
D	569	120,234.00
E	38	19,974.00
F	56	17,393.00
G	100	10,404.00
I	31	0.00
I INCH	1	0.00
J	2	0.00
K	1	0.00
L	1	0.00
Grand Totals:	14,048	573,120.00

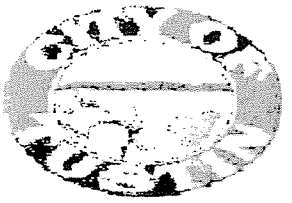
Utility Billing
Consumption by Meter Size



User: kunal
Printed: 09/13/2006 - 4:06 PM
Meter Status: Active
Period: 10
Year: 2004
From: Route 01 to Route 71
Conversion Type: No Conversion

Size	No of Accounts	Consumption
Meter size not specified.	3	0.00
A	9,938	190,840.00
A (1)	1	0.00
A (J)	1	0.00
B	2,952	100,003.00
C	354	17,097.00
D	569	95,971.00
E	38	8,085.00
F	56	9,048.00
G	100	13,008.00
I	31	0.00
1 INCH	1	0.00
J	2	0.00
K	1	0.00
L	1	0.00
Grand Totals:	14,048	434,052.00

Utility Billing
Consumption by Meter Size



User: kunal
Printed: 09/13/2006 - 4:08 PM
Meter Status: Active
Period: 11
Year: 2004
From: Route 01 to Route 71
Conversion Type: No Conversion

Size	No of Accounts	Consumption
Meter size not specified.	3	0.00
A	9,938	171,742.00
A (I)	1	0.00
A (J)	1	0.00
B	2,952	116,071.00
C	354	26,694.00
D	569	93,527.00
E	38	13,207.00
F	56	18,050.00
G	100	8,337.00
I	31	15.00
I INCH	1	0.00
J	2	1.00
K	1	0.00
L	1	0.00
Grand Totals:	14,048	447,644.00

Utility Billing
Consumption by Meter Size

User: kunal
Printed: 09/13/2006 - 4:14 PM
Meter Status: All Meters
Period: 12
Year: 2004
From: Route 01 to Route 71
Conversion Type: No Conversion

Size	No of Accounts	Consumption
Meter size not specified.	3	0.00
A	9,938	120,025.00
A (1)	1	0.00
A (J)	1	0.00
B	2,952	65,905.00
C	354	13,407.00
D	569	84,509.00
E	38	6,390.00
F	56	9,973.00
G	100	14,217.00
I	31	0.00
1 INCH	1	0.00
J	2	0.00
K	1	0.00
L	1	0.00
Grand Totals:	14,048	314,426.00

Utility Billing
Consumption by Meter Size

User: kunal
Printed: 09/13/2006 - 4:19 PM
Meter Status: All Meters
Period: 02
Year: 2005
From: Route 01 to Route 71
Conversion Type: No Conversion

Size	No of Accounts	Consumption
Meter size not specified.	3	0.00
A	9,938	119,701.00
A (I)	1	0.00
A (J)	1	0.00
B	2,952	66,360.00
C	354	13,576.00
D	569	79,498.00
E	38	6,257.00
F	56	9,966.00
G	100	14,553.00
I	31	0.00
I INCH	1	0.00
J	2	0.00
K	1	0.00
L	1	0.00
Grand Totals:	14,048	309,911.00

Utility Billing
Consumption by Meter Size

User: kunal
Printed: 09/13/2006 - 4:16 PM
Meter Status: All Meters
Period: 01
Year: 2005
From: Route 01 to Route 71
Conversion Type: No Conversion

Size	No of Accounts	Consumption
Meter size not specified.	3	0.00
A	9,938	135,095.00
A (I)	1	0.00
A (J)	1	0.00
B	2,952	90,755.00
C	354	23,532.00
D	569	89,424.00
E	38	12,488.00
F	56	7,480.00
G	100	8,167.00
I	31	0.00
I INCH	1	0.00
J	2	0.00
K	1	0.00
L	1	0.00
Grand Totals:	14,048	366,941.00

Utility Billing
Consumption by Meter Size

User: kunal
Printed: 09/13/2006 - 4:21 PM
Meter Status: All Meters
Period: 03
Year: 2005
From: Route 01 to Route 71
Conversion Type: No Conversion

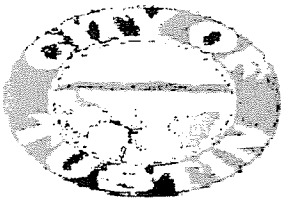
Size	No of Accounts	Consumption
Meter size not specified.	3	0.00
A	9,938	109,579.00
A (I)	1	0.00
A (J)	1	0.00
B	2,952	65,778.00
C	354	19,733.00
D	569	77,942.00
E	38	11,009.00
F	56	6,850.00
G	100	6,192.00
I	31	7.00
I INCH	1	0.00
J	2	1.00
K	1	0.00
L	1	0.00
Grand Totals:	14,048	297,091.00

Utility Billing
Consumption by Meter Size

User: kunal
Printed: 09/13/2006 - 4:29 PM
Meter Status: All Meters
Period: 04
Year: 2005
From: Route 01 to Route 71
Conversion Type: No Conversion

Size	No of Accounts	Consumption
Meter size not specified.	3	0.00
A	9,938	139,167.00
A (I)	1	0.00
A (J)	1	0.00
B	2,952	75,879.00
C	354	12,418.00
D	569	83,277.00
E	38	7,052.00
F	56	13,037.00
G	100	15,447.00
I	31	0.00
I INCH	1	0.00
J	2	0.00
K	1	0.00
L	1	0.00
Grand Totals:	14,048	346,277.00

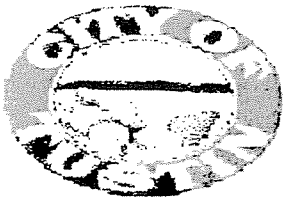
Utility Billing
Consumption by Meter Size



User: kunal
Printed: 09/13/2006 - 4:32 PM
Meter Status: All Meters
Period: 05
Year: 2005
From: Route 01 to Route 71
Conversion Type: No Conversion

Size	No of Accounts	Consumption
Meter size not specified.	3	0.00
A	9,938	168,147.00
A (I)	1	0.00
A (J)	1	0.00
B	2,952	106,933.00
C	354	26,504.00
D	569	102,193.00
E	38	17,692.00
F	56	12,661.00
G	100	11,318.00
I	31	0.00
I INCH	1	0.00
J	2	0.00
K	1	0.00
L	1	0.00
Grand Totals:	14,048	445,448.00

Utility Billing
Consumption by Meter Size



User: kunal
Printed: 09/13/2006 - 4:46 PM
Meter Status: All Meters
Period: 06
Year: 2005
From: Route 01 to Route 71
Conversion Type: No Conversion

Size	No of Accounts	Consumption
Meter size not specified.	3	0.00
A	9,938	176,745.00
A (I)	1	0.00
A (J)	1	0.00
B	2,952	91,273.00
C	354	14,551.00
D	569	92,819.00
E	38	9,518.00
F	56	15,719.00
G	100	14,370.00
I	31	22.00
I INCH	1	0.00
J	2	0.00
K	1	0.00
L	1	0.00
Grand Totals:	14,048	415,017.00

Utility Billing
Consumption by Meter Size

User: kunal
Printed: 09/13/2006 - 3:33 PM
Meter Status: All Meters
Period: 07
Year: 2004
From: Route 01 to Route 71
Conversion Type: No Conversion

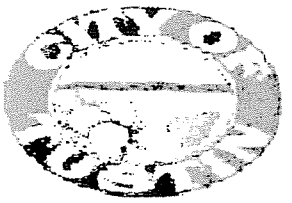
Size	No of Accounts	Consumption
Meter size not specified.	3	0.00
A	9,938	226,215.00
A (I)	1	0.00
A (J)	1	0.00
B	2,952	148,659.00
C	354	36,141.00
D	569	128,520.00
E	38	20,806.00
F	56	20,173.00
G	100	9,346.00
I	31	45.00
I INCH	1	0.00
J	2	4.00
K	1	0.00
L	1	0.00
Grand Totals:	14,048	589,909.00

Utility Billing
Consumption by Meter Size

User: kunal
Printed: 09/13/2006 - 4:01 PM
Meter Status: All Meters
Period: 08
Year: 2004
From: Route 01 to Route 71
Conversion Type: No Conversion

Size	No of Accounts	Consumption
Meter size not specified.	3	0.00
A	9,938	255,768.00
A (I)	1	0.00
A (J)	1	0.00
B	2,952	130,978.00
C	354	19,447.00
D	569	123,573.00
E	38	14,255.00
F	56	18,773.00
G	100	18,770.00
I	31	0.00
I INCH	1	0.00
J	2	0.00
K	1	0.00
L	1	0.00
Grand Totals:	14,048	581,564.00

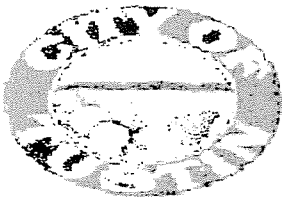
Utility Billing
Consumption by Meter Size



User: kunal
Printed: 09/13/2006 - 4:04 PM
Meter Status: All Meters
Period: 09
Year: 2004
From: Route 01 to Route 71
Conversion Type: No Conversion

Size	No of Accounts	Consumption
Meter size not specified.	3	0.00
A	9,938	224,002.00
A (I)	1	0.00
A (J)	1	0.00
B	2,952	146,595.00
C	354	34,518.00
D	569	120,234.00
E	38	19,974.00
F	56	17,393.00
G	100	10,404.00
I	31	0.00
I INCH	1	0.00
J	2	0.00
K	1	0.00
L	1	0.00
Grand Totals:	14,048	573,120.00

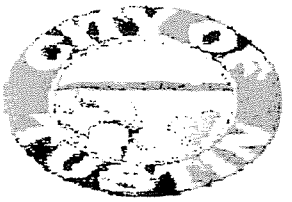
Utility Billing
Consumption by Meter Size



User: kunal
Printed: 09/13/2006 - 4:06 PM
Meter Status: Active
Period: 10
Year: 2004
From: Route 01 to Route 71
Conversion Type: No Conversion

Size	No of Accounts	Consumption
Meter size not specified.	3	0.00
A	9,938	190,840.00
A (I)	1	0.00
A (J)	1	0.00
B	2,952	100,003.00
C	354	17,097.00
D	569	95,971.00
E	38	8,085.00
F	56	9,048.00
G	100	13,008.00
I	31	0.00
1 INCH	1	0.00
J	2	0.00
K	1	0.00
L	1	0.00
Grand Totals:	14,048	434,052.00

Utility Billing
Consumption by Meter Size



User: kunal
Printed: 09/13/2006 - 4:08 PM
Meter Status: Active
Period: 11
Year: 2004
From: Route 01 to Route 71
Conversion Type: No Conversion

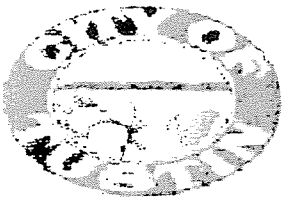
Size	No of Accounts	Consumption
Meter size not specified.	3	0.00
A	9,938	171,742.00
A (I)	1	0.00
A (J)	1	0.00
B	2,952	116,071.00
C	354	26,694.00
D	569	93,527.00
E	38	13,207.00
F	56	18,050.00
G	100	8,337.00
I	31	15.00
I INCH	1	0.00
J	2	1.00
K	1	0.00
L	1	0.00
Grand Totals:	14,048	447,644.00

Utility Billing
Consumption by Meter Size

User: kunal
Printed: 09/13/2006 - 4:14 PM
Meter Status: All Meters
Period: 12
Year: 2004
From: Route 01 to Route 71
Conversion Type: No Conversion

Size	No of Accounts	Consumption
Meter size not specified.	3	0.00
A	9,938	120,025.00
A (1)	1	0.00
A (J)	1	0.00
B	2,952	65,905.00
C	354	13,407.00
D	569	84,509.00
E	38	6,390.00
F	56	9,973.00
G	100	14,217.00
I	31	0.00
1 INCH	1	0.00
J	2	0.00
K	1	0.00
L	1	0.00
Grand Totals:	14,048	314,426.00

Utility Billing
Consumption by Meter Size



User: kunal
Printed: 09/13/2006 - 4:19 PM
Meter Status: All Meters
Period: 02
Year: 2005
From: Route 01 to Route 71
Conversion Type: No Conversion

Size	No of Accounts	Consumption
Meter size not specified.	3	0.00
A	9,938	119,701.00
A (I)	1	0.00
A (J)	1	0.00
B	2,952	66,360.00
C	354	13,576.00
D	569	79,498.00
E	38	6,257.00
F	56	9,966.00
G	100	14,553.00
I	31	0.00
I INCH	1	0.00
J	2	0.00
K	1	0.00
L	1	0.00
Grand Totals:	14,048	309,911.00

Utility Billing
Consumption by Meter Size

User: kunal
Printed: 09/13/2006 - 4:16 PM
Meter Status: All Meters
Period: 01
Year: 2005
From: Route 01 to Route 71
Conversion Type: No Conversion

Size	No of Accounts	Consumption
Meter size not specified.	3	0.00
A	9,938	135,095.00
A (I)	1	0.00
A (J)	1	0.00
B	2,952	90,755.00
C	354	23,532.00
D	569	89,424.00
E	38	12,488.00
F	56	7,480.00
G	100	8,167.00
I	31	0.00
I INCH	1	0.00
J	2	0.00
K	1	0.00
L	1	0.00
Grand Totals:	14,048	366,941.00

Utility Billing
Consumption by Meter Size

User: kunal
Printed: 09/13/2006 - 4:21 PM
Meter Status: All Meters
Period: 03
Year: 2005
From: Route 01 to Route 71
Conversion Type: No Conversion

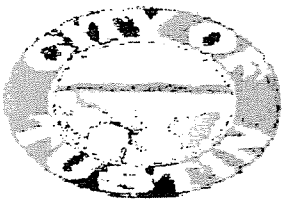
Size	No of Accounts	Consumption
Meter size not specified.	3	0.00
A	9,938	109,579.00
A (I)	1	0.00
A (J)	1	0.00
B	2,952	65,778.00
C	354	19,733.00
D	569	77,942.00
E	38	11,009.00
F	56	6,850.00
G	100	6,192.00
I	31	7.00
I INCH	1	0.00
J	2	1.00
K	1	0.00
L	1	0.00
Grand Totals:	14,048	297,091.00

Utility Billing
Consumption by Meter Size

User: kunal
Printed: 09/13/2006 - 4:29 PM
Meter Status: All Meters
Period: 04
Year: 2005
From: Route 01 to Route 71
Conversion Type: No Conversion

Size	No of Accounts	Consumption
Meter size not specified.	3	0.00
A	9,938	139,167.00
A (I)	1	0.00
A (J)	1	0.00
B	2,952	75,879.00
C	354	12,418.00
D	569	83,277.00
E	38	7,052.00
F	56	13,037.00
G	100	15,447.00
I	31	0.00
I INCH	1	0.00
J	2	0.00
K	1	0.00
L	1	0.00
Grand Totals:	14,048	346,277.00

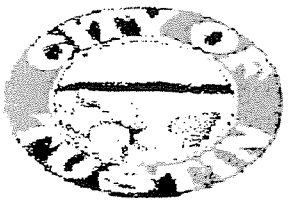
Utility Billing
Consumption by Meter Size



User: kunal
Printed: 09/13/2006 - 4:32 PM
Meter Status: All Meters
Period: 05
Year: 2005
From: Route 01 to Route 71
Conversion Type: No Conversion

Size	No of Accounts	Consumption
Meter size not specified.	3	0.00
A	9,938	168,147.00
A (I)	1	0.00
A (J)	1	0.00
B	2,952	106,933.00
C	354	26,504.00
D	569	102,193.00
E	38	17,692.00
F	56	12,661.00
G	100	11,318.00
I	31	0.00
I INCH	1	0.00
J	2	0.00
K	1	0.00
L	1	0.00
Grand Totals:	14,048	445,448.00

Utility Billing
Consumption by Meter Size



User: kunal
Printed: 09/13/2006 - 4:46 PM
Meter Status: All Meters
Period: 06
Year: 2005
From: Route 01 to Route 71
Conversion Type: No Conversion

Size	No of Accounts	Consumption
Meter size not specified.	3	0.00
A	9,938	176,745.00
A (I)	1	0.00
A (J)	1	0.00
B	2,952	91,273.00
C	354	14,551.00
D	569	92,819.00
E	38	9,518.00
F	56	15,719.00
G	100	14,370.00
I	31	22.00
I INCH	1	0.00
J	2	0.00
K	1	0.00
L	1	0.00
Grand Totals:	14,048	415,017.00

APPENDIX D

Flow Reports for the City of Tustin

MUNICIPAL WATER DISTRICT OF ORANGE COUNTY

10500 Ellis Avenue
P.O. Box 20895
Fountain Valley, California 92728
(714) 963-3058
Fax: (714) 964-9389
www.mwdoc.com

October 9, 2006

Stephen Davis
Vice President
Malcolm Pirnie
2150 River Plaza Drive, Suite 164
Sacramento, CA 95833

Frederick Adjarian
Water Services Manager
City of Tustin
1472 Service Road
Tustin, CA 92780

Re: Water Audit Demonstration Project – Flow Reports for Ten Single-Family Homes

Dear Steve and Fred,

Enclosed are Flow Reports for ten homes as a follow-up to our September 12, 2006 meeting at the Tustin Water Department offices.

Barry Carlson on my staff installed Meter Master data loggers on each of these homes for seven day periods. The Data Summary of the Flow Report includes Cumulative Volume, Maximum Volume, Maximum Flow Rate, Average Flow Rate, and Minimum Flow Rate.

Should you have any questions regarding these Flow Reports, please contact Barry Carlson at (714) 593-5017 on Monday's or Tuesdays or by e-mail at bcarslon@mwdoc.com.

Sincerely,

Joseph M. Berg
Water Use Efficiency Programs Manager

Attachment
Cc: Barry Carlson
Jose Diaz & Kunal Mittal, City of Tustin

Data File Name: C:\PROGRAMF\MMV30\TUSTINSU.MDB

Flow Report

Location Information

ID	4
Name	City of Tustin
Address	13541 Sussex
City	Tustin
State/Prov	CA
Postal Code	
Phone	
Notes	

Meter Information

Make	Badger
Model	Recordall PD
Size	Model 25
Unit	Gallons

Grid Interval	3,600	Seconds
Max-Min Interval	60	Seconds

Date/Time	Volume	Maximum	Average	Minimum
09/26/06 13:50:36	6.74	1.30	0.11	0.01
09/26/06 14:50:36	4.38	1.12	0.07	0.02
09/26/06 15:50:36	54.22	7.80	0.90	0.01
09/26/06 16:50:36	69.03	5.99	1.15	0.01
09/26/06 17:50:36	3.42	0.65	0.06	0.01
09/26/06 18:50:36	8.13	1.12	0.14	0.01
09/26/06 19:50:36	318.05	15.74	5.30	0.02
09/26/06 20:50:36	87.53	15.78	1.46	0.02
09/26/06 21:50:36	40.45	3.61	0.67	0.01
09/26/06 22:50:36	1.50	0.07	0.03	0.01
09/26/06 23:50:36	1.48	0.08	0.03	0.01
09/27/06 00:50:36	1.18	0.03	0.02	0.00
09/27/06 01:50:36	1.00	0.04	0.02	0.00
09/27/06 02:50:36	1.10	0.05	0.02	0.00
09/27/06 03:50:36	1.09	0.04	0.02	0.00
09/27/06 04:50:36	1.25	0.05	0.02	0.00
09/27/06 05:50:36	4.93	2.13	0.08	0.01
09/27/06 06:50:36	1.33	0.04	0.02	0.01
09/27/06 07:50:36	359.45	15.39	5.99	0.02
09/27/06 08:50:36	25.00	2.25	0.42	0.01
09/27/06 09:50:36	5.98	1.30	0.10	0.02
09/27/06 10:50:36	2.14	0.39	0.04	0.02
09/27/06 11:50:36	2.47	0.52	0.04	0.01
09/27/06 12:50:36	2.55	0.78	0.04	0.01
09/27/06 13:50:36	1.65	0.06	0.03	0.01
09/27/06 14:50:36	7.35	1.38	0.12	0.01
09/27/06 15:50:36	7.84	1.76	0.13	0.01
09/27/06 16:50:36	343.38	15.84	5.72	0.01
09/27/06 17:50:36	35.28	15.77	0.59	0.01
09/27/06 18:50:36	1.55	0.04	0.03	0.02
09/27/06 19:50:36	5.36	1.42	0.09	0.01
09/27/06 20:50:36	18.37	2.48	0.31	0.01

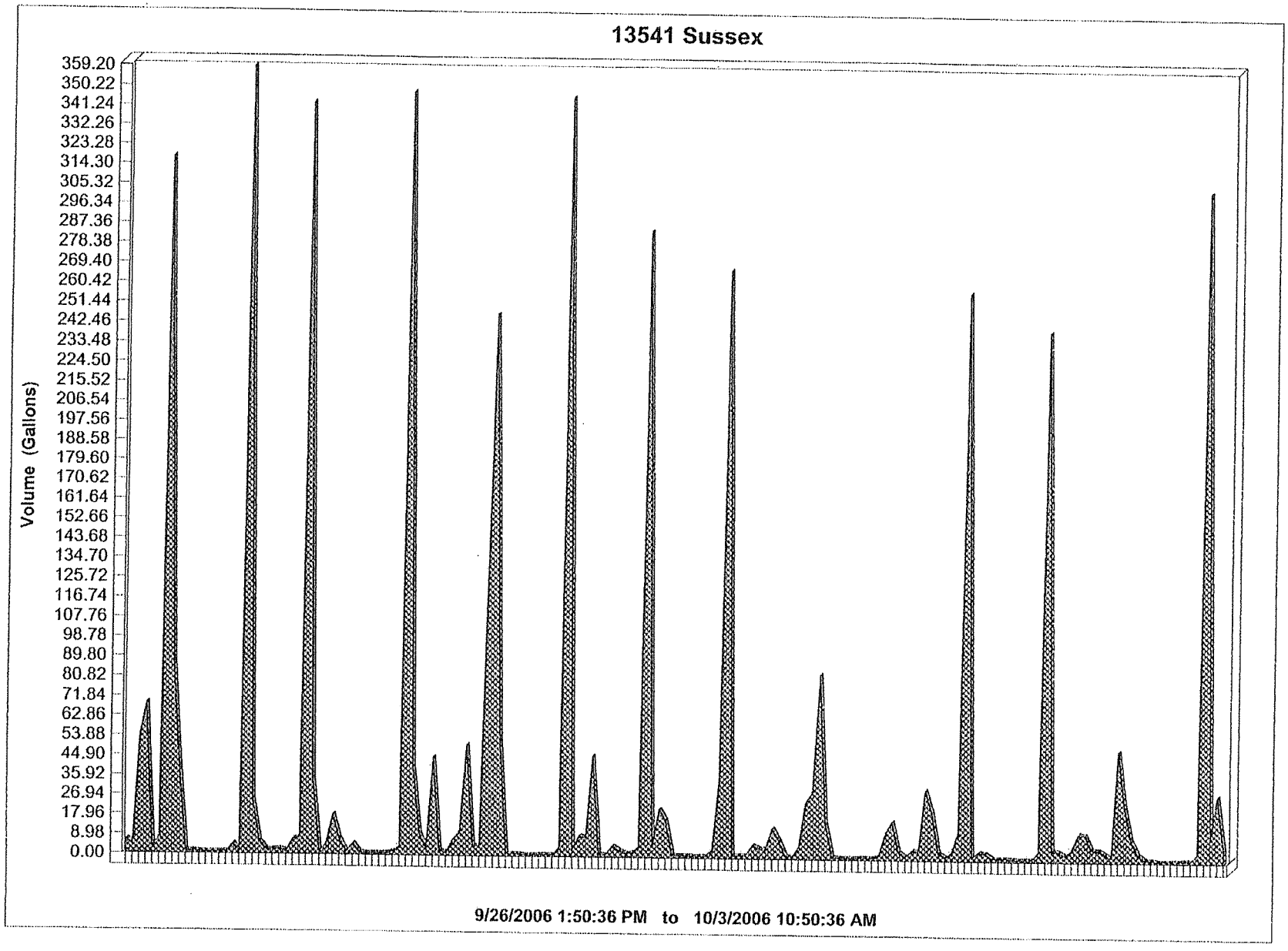
Date/Time	Volume	Maximum	Average	Minimum
09/27/06 21:50:36	7.56	2.03	0.13	0.01
09/27/06 22:50:36	1.64	0.16	0.03	0.01
09/27/06 23:50:36	5.43	1.64	0.09	0.00
09/28/06 00:50:36	1.27	0.05	0.02	0.01
09/28/06 01:50:36	1.04	0.04	0.02	0.00
09/28/06 02:50:36	1.07	0.04	0.02	0.00
09/28/06 03:50:36	0.97	0.04	0.02	0.00
09/28/06 04:50:36	1.21	0.05	0.02	0.00
09/28/06 05:50:36	1.98	0.42	0.03	0.01
09/28/06 06:50:36	4.05	2.19	0.07	0.01
09/28/06 07:50:36	348.26	15.15	5.80	0.02
09/28/06 08:50:36	41.01	3.63	0.68	0.01
09/28/06 09:50:36	9.72	1.72	0.16	0.01
09/28/06 10:50:36	3.39	1.67	0.06	0.01
09/28/06 11:50:36	45.12	4.74	0.75	0.02
09/28/06 12:50:36	2.43	0.68	0.04	0.01
09/28/06 13:50:36	1.49	0.07	0.03	0.01
09/28/06 14:50:36	7.70	1.01	0.13	0.01
09/28/06 15:50:36	11.25	1.16	0.19	0.01
09/28/06 16:50:36	50.97	2.39	0.85	0.01
09/28/06 17:50:36	4.92	1.14	0.08	0.01
09/28/06 18:50:36	4.68	1.14	0.08	0.01
09/28/06 19:50:36	129.06	10.83	2.15	0.01
09/28/06 20:50:36	247.03	15.92	4.12	0.02
09/28/06 21:50:36	53.05	2.29	0.88	0.01
09/28/06 22:50:36	1.39	0.07	0.02	0.01
09/28/06 23:50:36	1.40	0.05	0.02	0.01
09/29/06 00:50:36	1.19	0.04	0.02	0.00
09/29/06 01:50:36	0.90	0.03	0.01	0.00
09/29/06 02:50:36	1.03	0.04	0.02	0.00
09/29/06 03:50:36	1.13	0.03	0.02	0.00
09/29/06 04:50:36	1.18	0.03	0.02	0.00
09/29/06 05:50:36	1.07	0.04	0.02	0.00
09/29/06 06:50:36	4.70	1.94	0.08	0.01
09/29/06 07:50:36	346.53	15.09	5.78	0.02
09/29/06 08:50:36	3.79	1.47	0.06	0.01
09/29/06 09:50:36	9.90	1.31	0.17	0.01
09/29/06 10:50:36	9.15	2.07	0.15	0.02
09/29/06 11:50:36	46.50	3.99	0.77	0.01
09/29/06 12:50:36	1.57	0.05	0.03	0.01
09/29/06 13:50:36	1.57	0.05	0.03	0.01
09/29/06 14:50:36	5.39	1.50	0.09	0.02
09/29/06 15:50:36	3.40	1.68	0.06	0.01
09/29/06 16:50:36	1.90	0.18	0.03	0.01
09/29/06 17:50:36	2.60	0.83	0.04	0.01
09/29/06 18:50:36	5.12	0.76	0.09	0.01
09/29/06 19:50:36	285.53	12.35	4.76	0.02
09/29/06 20:50:36	5.17	1.12	0.09	0.01
09/29/06 21:50:36	22.30	3.70	0.37	0.02
09/29/06 22:50:36	17.29	3.61	0.29	0.01
09/29/06 23:50:36	1.52	0.07	0.03	0.01
09/30/06 00:50:36	1.44	0.06	0.02	0.00
09/30/06 01:50:36	1.41	0.08	0.02	0.00
09/30/06 02:50:36	0.97	0.04	0.02	0.00
09/30/06 03:50:36	1.13	0.04	0.02	0.00
09/30/06 04:50:36	1.10	0.03	0.02	0.00
09/30/06 05:50:36	4.48	2.56	0.08	0.00
09/30/06 06:50:36	35.93	2.20	0.60	0.01
09/30/06 07:50:36	268.16	11.36	4.47	0.02
09/30/06 08:50:36	1.57	0.04	0.03	0.02

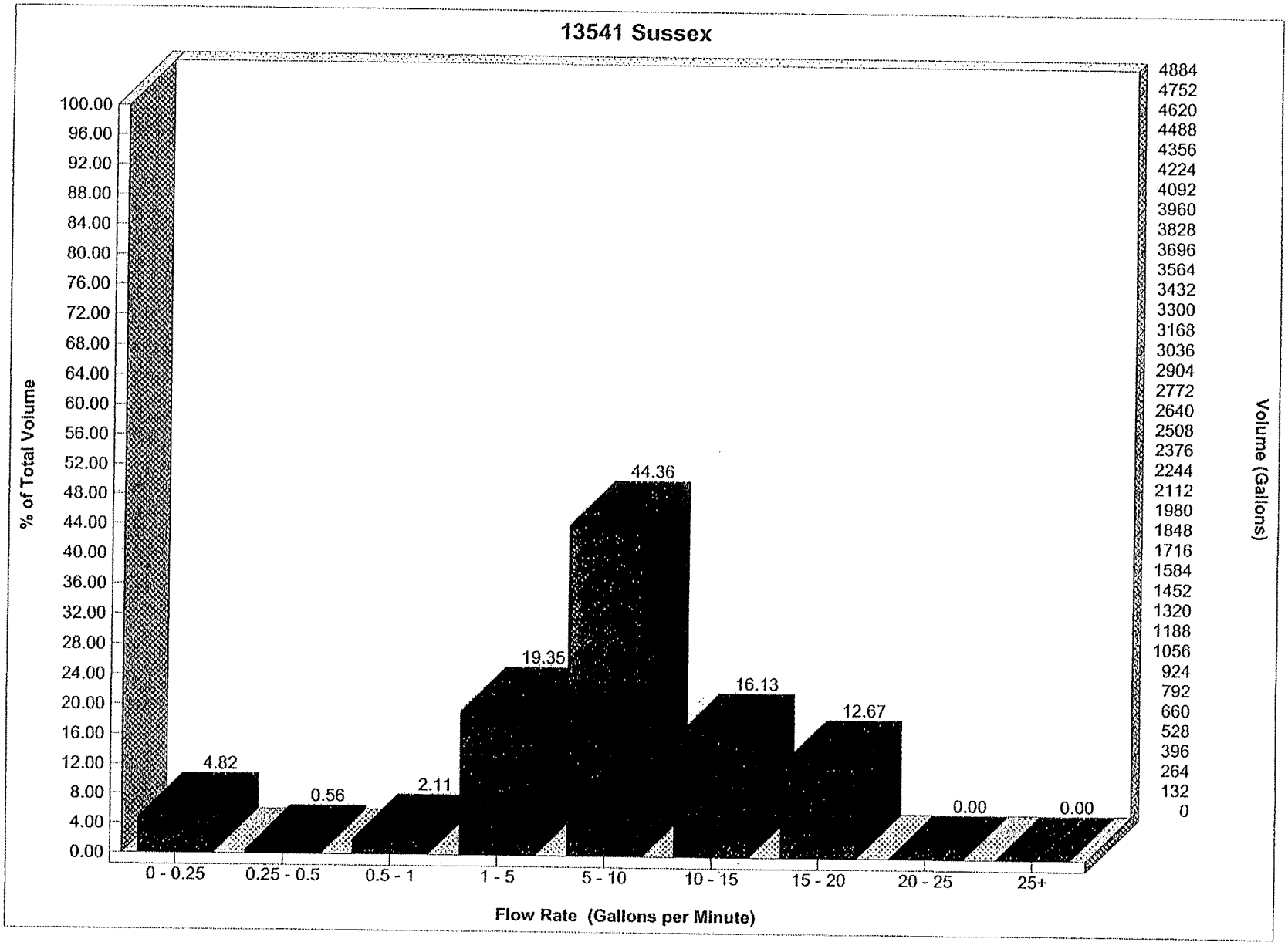
Date/Time	Volume	Maximum	Average	Minimum
09/30/06 09:50:36	1.71	0.05	0.03	0.02
09/30/06 10:50:36	1.72	0.04	0.03	0.01
09/30/06 11:50:36	6.39	2.10	0.11	0.01
09/30/06 12:50:36	4.95	0.75	0.08	0.02
09/30/06 13:50:36	4.83	0.73	0.08	0.01
09/30/06 14:50:36	14.14	2.05	0.24	0.02
09/30/06 15:50:36	8.64	3.25	0.14	0.01
09/30/06 16:50:36	1.56	0.04	0.03	0.01
09/30/06 17:50:36	1.48	0.04	0.03	0.01
09/30/06 18:50:36	5.96	1.54	0.10	0.01
09/30/06 19:50:36	26.24	3.67	0.44	0.01
09/30/06 20:50:36	30.74	3.64	0.51	0.01
09/30/06 21:50:36	84.52	4.48	1.41	0.01
09/30/06 22:50:36	16.36	2.27	0.27	0.01
09/30/06 23:50:36	1.31	0.03	0.02	0.01
10/01/06 00:50:36	1.26	0.05	0.02	0.01
10/01/06 01:50:36	1.09	0.04	0.02	0.00
10/01/06 02:50:36	1.13	0.05	0.02	0.00
10/01/06 03:50:36	1.29	0.06	0.02	0.00
10/01/06 04:50:36	1.22	0.03	0.02	0.01
10/01/06 05:50:36	1.26	0.04	0.02	0.01
10/01/06 06:50:36	2.12	0.32	0.04	0.01
10/01/06 07:50:36	12.36	2.04	0.21	0.02
10/01/06 08:50:36	17.71	1.40	0.29	0.02
10/01/06 09:50:36	3.88	1.12	0.06	0.01
10/01/06 10:50:36	1.79	0.05	0.03	0.02
10/01/06 11:50:36	4.70	0.79	0.08	0.01
10/01/06 12:50:36	4.04	0.74	0.07	0.02
10/01/06 13:50:36	32.24	4.75	0.54	0.01
10/01/06 14:50:36	21.75	4.71	0.36	0.01
10/01/06 15:50:36	3.68	1.64	0.06	0.01
10/01/06 16:50:36	1.89	0.22	0.03	0.01
10/01/06 17:50:36	4.41	1.58	0.07	0.02
10/01/06 18:50:36	13.37	4.56	0.22	0.01
10/01/06 19:50:36	258.75	11.59	4.31	0.02
10/01/06 20:50:36	2.00	0.21	0.03	0.02
10/01/06 21:50:36	4.24	0.77	0.07	0.02
10/01/06 22:50:36	3.74	0.94	0.06	0.01
10/01/06 23:50:36	1.63	0.06	0.03	0.01
10/02/06 00:50:36	1.66	0.05	0.03	0.01
10/02/06 01:50:36	1.65	0.05	0.03	0.01
10/02/06 02:50:36	1.29	0.05	0.02	0.00
10/02/06 03:50:36	1.14	0.03	0.02	0.00
10/02/06 04:50:36	1.19	0.03	0.02	0.00
10/02/06 05:50:36	1.21	0.04	0.02	0.00
10/02/06 06:50:36	4.93	1.47	0.08	0.01
10/02/06 07:50:36	241.68	10.12	4.03	0.02
10/02/06 08:50:36	5.33	1.26	0.09	0.02
10/02/06 09:50:36	4.78	1.10	0.08	0.02
10/02/06 10:50:36	3.14	1.20	0.05	0.01
10/02/06 11:50:36	5.94	2.62	0.10	0.01
10/02/06 12:50:36	12.82	2.28	0.21	0.01
10/02/06 13:50:36	12.60	1.71	0.21	0.02
10/02/06 14:50:36	5.95	1.57	0.10	0.01
10/02/06 15:50:36	5.61	0.78	0.09	0.02
10/02/06 16:50:36	3.90	1.26	0.06	0.01
10/02/06 17:50:36	2.47	0.30	0.04	0.01
10/02/06 18:50:36	51.09	4.28	0.85	0.02
10/02/06 19:50:36	25.21	3.80	0.42	0.02
10/02/06 20:50:36	10.03	2.44	0.17	0.01

Date/Time	Volume	Maximum	Average	Minimum
10/02/06 21:50:36	3.92	2.05	0.06	0.01
10/02/06 22:50:36	1.79	0.06	0.03	0.01
10/02/06 23:50:36	1.38	0.05	0.02	0.00
10/03/06 00:50:36	1.04	0.04	0.02	0.00
10/03/06 01:50:36	1.04	0.04	0.02	0.00
10/03/06 02:50:36	1.08	0.04	0.02	0.00
10/03/06 03:50:36	1.15	0.04	0.02	0.00
10/03/06 04:50:36	1.27	0.04	0.02	0.01
10/03/06 05:50:36	1.32	0.04	0.02	0.01
10/03/06 06:50:36	4.50	0.74	0.08	0.01
10/03/06 07:50:36	305.77	15.37	5.10	0.02
10/03/06 08:50:36	11.12	1.55	0.19	0.02
10/03/06 09:50:36	30.80	2.20	0.51	0.02
10/03/06 10:50:36	6.25	1.22	0.10	0.02

Data Summary

Cumulative Volume	4,899.06
Maximum Volume	359.45
Maximum Flow Rate	15.92
Average Flow Rate	0.49
Minimum Flow Rate	0.00


13541 Sussex
Volume (Gallons)
359.20
350.22
341.24
332.26
323.28
314.30
305.32
296.34
287.36
278.38
269.40
260.42
251.44
242.46
233.48
224.50
215.52
206.54
197.56
188.58
179.60
170.62
161.64
152.66
143.68
134.70
125.72
116.74
107.76
98.78
89.80
80.82
71.84
62.86
53.88
44.90
35.92
26.94
17.96
8.98
0.00
9/26/2006 1:50:36 PM to 10/3/2006 10:50:36 AM


13541 Sussex
% of Total Volume
100.00
96.00
92.00
88.00
84.00
80.00
76.00
72.00
68.00
64.00
60.00
56.00
52.00
48.00
44.00
40.00
36.00
32.00
28.00
24.00
20.00
16.00
12.00
8.00
4.00
0.00
4.82
0.56
2.11
19.35
44.36
16.13
12.67
0.00
0.00
0 - 0.25
0.25 - 0.5
0.5 - 1
1 - 5
5 - 10
10 - 15
15 - 20
20 - 25
25+
Flow Rate (Gallons per Minute)
Volume (Gallons)
4884
4752
4620
4488
4356
4224
4092
3960
3828
3696
3564
3432
3300
3168
3036
2904
2772
2640
2508
2376
2244
2112
1980
1848
1716
1584
1452
1320
1188
1056
924
792
660
528
396
264
132
0

Data File Name C:\PROGRAMF\MMV30\TUSTINBR.MDB

Flow Report

Location Information

ID	3
Name	City of Tustin
Address	13922 Brenan
City	Tustin
State/Prov	CA
Postal Code	
Phone	
Notes	

Meter Information

Make	Badger
Model	Recordall PD
Size	Model 25
Unit	Gallons

Grid Interval	3,600	Seconds
Max-Min Interval	60	Seconds

Date/Time	Volume	Maximum	Average	Minimum
09/26/06 14:12:34	18.18	2.24	0.30	0.01
09/26/06 15:12:34	8.71	2.80	0.14	0.00
09/26/06 16:12:34	8.97	1.91	0.15	0.00
09/26/06 17:12:34	16.90	4.11	0.28	0.01
09/26/06 18:12:34	6.48	2.52	0.11	0.00
09/26/06 19:12:34	14.00	2.81	0.23	0.00
09/26/06 20:12:34	2.17	0.24	0.04	0.01
09/26/06 21:12:34	25.03	4.29	0.42	0.00
09/26/06 22:12:34	14.92	1.83	0.25	0.00
09/26/06 23:12:34	12.13	2.50	0.20	0.00
09/27/06 00:12:34	17.82	3.90	0.30	0.00
09/27/06 01:12:34	3.19	2.41	0.05	0.00
09/27/06 02:12:34	0.43	0.06	0.01	0.00
09/27/06 03:12:34	0.73	0.06	0.01	0.00
09/27/06 04:12:34	10.93	2.22	0.18	0.00
09/27/06 05:12:34	4.13	1.96	0.07	0.00
09/27/06 06:12:34	1.09	0.09	0.02	0.00
09/27/06 07:12:34	174.69	16.34	2.91	0.00
09/27/06 08:12:34	595.61	12.58	9.93	4.12
09/27/06 09:12:34	118.46	13.77	1.97	0.01
09/27/06 10:12:34	8.49	3.11	0.14	0.00
09/27/06 11:12:34	30.22	4.45	0.50	0.01
09/27/06 12:12:34	51.10	3.60	0.85	0.01
09/27/06 13:12:34	24.75	2.81	0.41	0.00
09/27/06 14:12:34	11.66	3.54	0.19	0.00
09/27/06 15:12:34	12.79	2.63	0.21	0.00
09/27/06 16:12:34	4.91	0.80	0.08	0.00
09/27/06 17:12:34	13.58	2.78	0.23	0.01
09/27/06 18:12:34	11.40	1.80	0.19	0.00
09/27/06 19:12:34	22.57	2.88	0.38	0.01
09/27/06 20:12:34	25.93	3.35	0.43	0.01
09/27/06 21:12:34	26.27	3.06	0.44	0.00

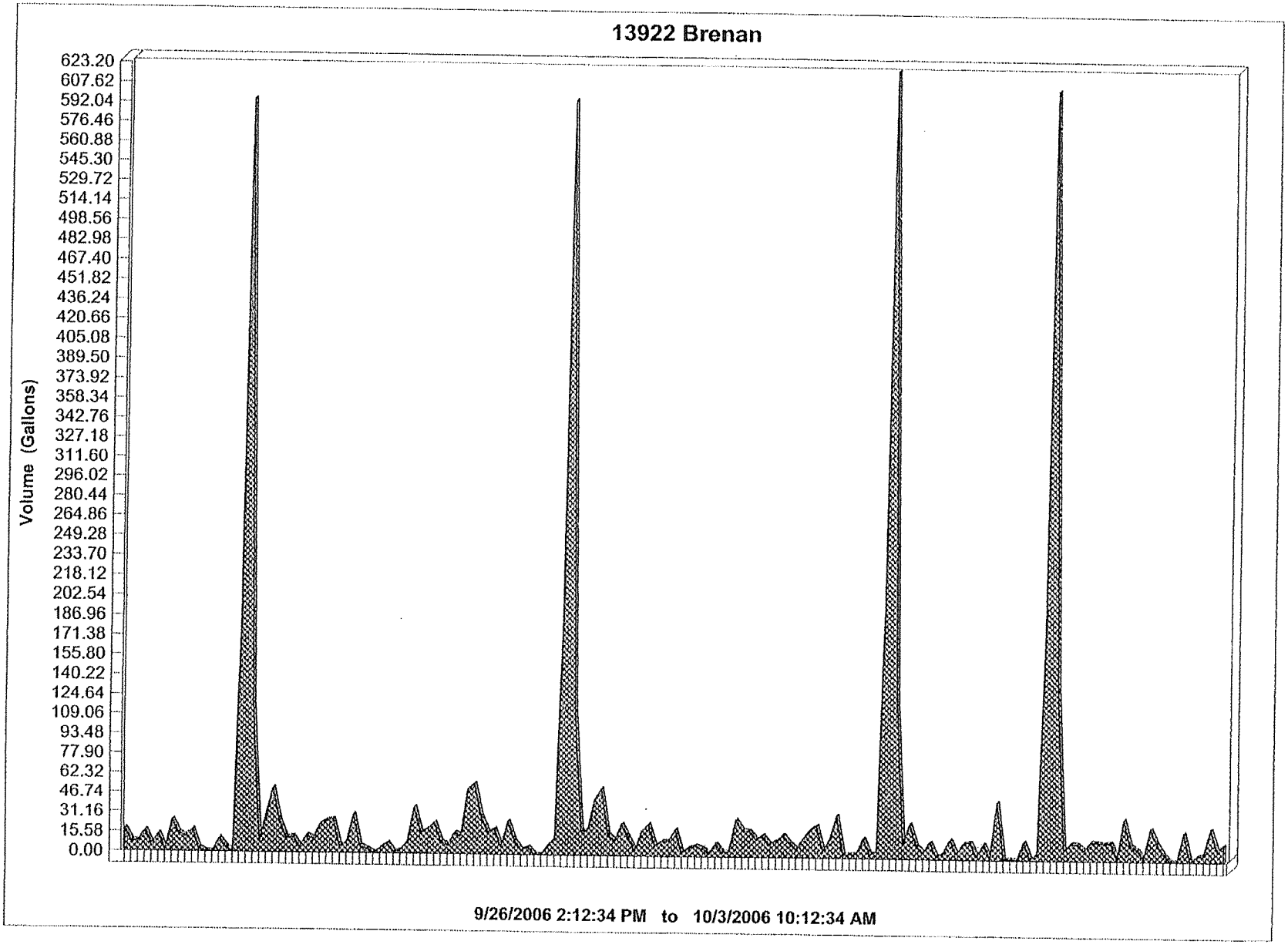
Date/Time	Volume	Maximum	Average	Minimum
09/27/06 22:12:34	5.15	0.81	0.09	0.00
09/27/06 23:12:34	8.86	2.02	0.15	0.00
09/28/06 00:12:34	30.69	4.07	0.51	0.00
09/28/06 01:12:34	6.01	1.52	0.10	0.00
09/28/06 02:12:34	3.59	2.39	0.06	0.00
09/28/06 03:12:34	0.43	0.05	0.01	0.00
09/28/06 04:12:34	4.69	2.58	0.08	0.00
09/28/06 05:12:34	8.30	1.44	0.14	0.00
09/28/06 06:12:34	1.43	0.08	0.02	0.01
09/28/06 07:12:34	3.20	0.59	0.05	0.01
09/28/06 08:12:34	9.56	2.12	0.16	0.01
09/28/06 09:12:34	36.82	3.52	0.61	0.01
09/28/06 10:12:34	16.91	3.32	0.28	0.00
09/28/06 11:12:34	19.75	3.87	0.33	0.00
09/28/06 12:12:34	24.66	3.10	0.41	0.00
09/28/06 13:12:34	9.82	2.39	0.16	0.00
09/28/06 14:12:34	7.39	3.91	0.12	0.00
09/28/06 15:12:34	16.85	2.66	0.28	0.00
09/28/06 16:12:34	14.58	1.55	0.24	0.00
09/28/06 17:12:34	51.71	6.06	0.86	0.01
09/28/06 18:12:34	56.06	3.42	0.93	0.01
09/28/06 19:12:34	30.06	5.09	0.50	0.00
09/28/06 20:12:34	17.78	3.62	0.30	0.00
09/28/06 21:12:34	19.86	3.20	0.33	0.01
09/28/06 22:12:34	6.05	2.69	0.10	0.00
09/28/06 23:12:34	26.22	4.39	0.44	0.00
09/29/06 00:12:34	11.27	2.35	0.19	0.00
09/29/06 01:12:34	3.97	2.05	0.07	0.00
09/29/06 02:12:34	6.22	1.50	0.10	0.00
09/29/06 03:12:34	0.53	0.05	0.01	0.00
09/29/06 04:12:34	0.60	0.05	0.01	0.00
09/29/06 05:12:34	8.31	1.96	0.14	0.00
09/29/06 06:12:34	13.57	3.71	0.23	0.00
09/29/06 07:12:34	174.24	16.53	2.90	0.00
09/29/06 08:12:34	597.05	14.12	9.95	4.15
09/29/06 09:12:34	113.99	13.42	1.90	0.01
09/29/06 10:12:34	19.06	3.95	0.32	0.01
09/29/06 11:12:34	20.85	1.49	0.35	0.00
09/29/06 12:12:34	44.58	4.01	0.74	0.01
09/29/06 13:12:34	53.08	4.09	0.88	0.01
09/29/06 14:12:34	17.00	2.98	0.28	0.00
09/29/06 15:12:34	12.25	2.41	0.20	0.00
09/29/06 16:12:34	25.06	2.08	0.42	0.01
09/29/06 17:12:34	14.76	3.62	0.25	0.02
09/29/06 18:12:34	4.70	0.46	0.08	0.00
09/29/06 19:12:34	19.52	2.86	0.32	0.00
09/29/06 20:12:34	25.23	2.81	0.42	0.01
09/29/06 21:12:34	8.45	1.97	0.14	0.01
09/29/06 22:12:34	11.82	1.58	0.20	0.01
09/29/06 23:12:34	12.16	2.42	0.20	0.02
09/30/06 00:12:34	21.15	3.53	0.35	0.02
09/30/06 01:12:34	3.54	0.12	0.06	0.01
09/30/06 02:12:34	6.79	2.45	0.11	0.01
09/30/06 03:12:34	8.47	1.52	0.14	0.01
09/30/06 04:12:34	6.79	4.07	0.11	0.01
09/30/06 05:12:34	3.07	0.13	0.05	0.01
09/30/06 06:12:34	10.37	1.45	0.17	0.01
09/30/06 07:12:34	3.93	0.35	0.07	0.00
09/30/06 08:12:34	4.36	1.47	0.07	0.01
09/30/06 09:12:34	29.07	3.73	0.49	0.02

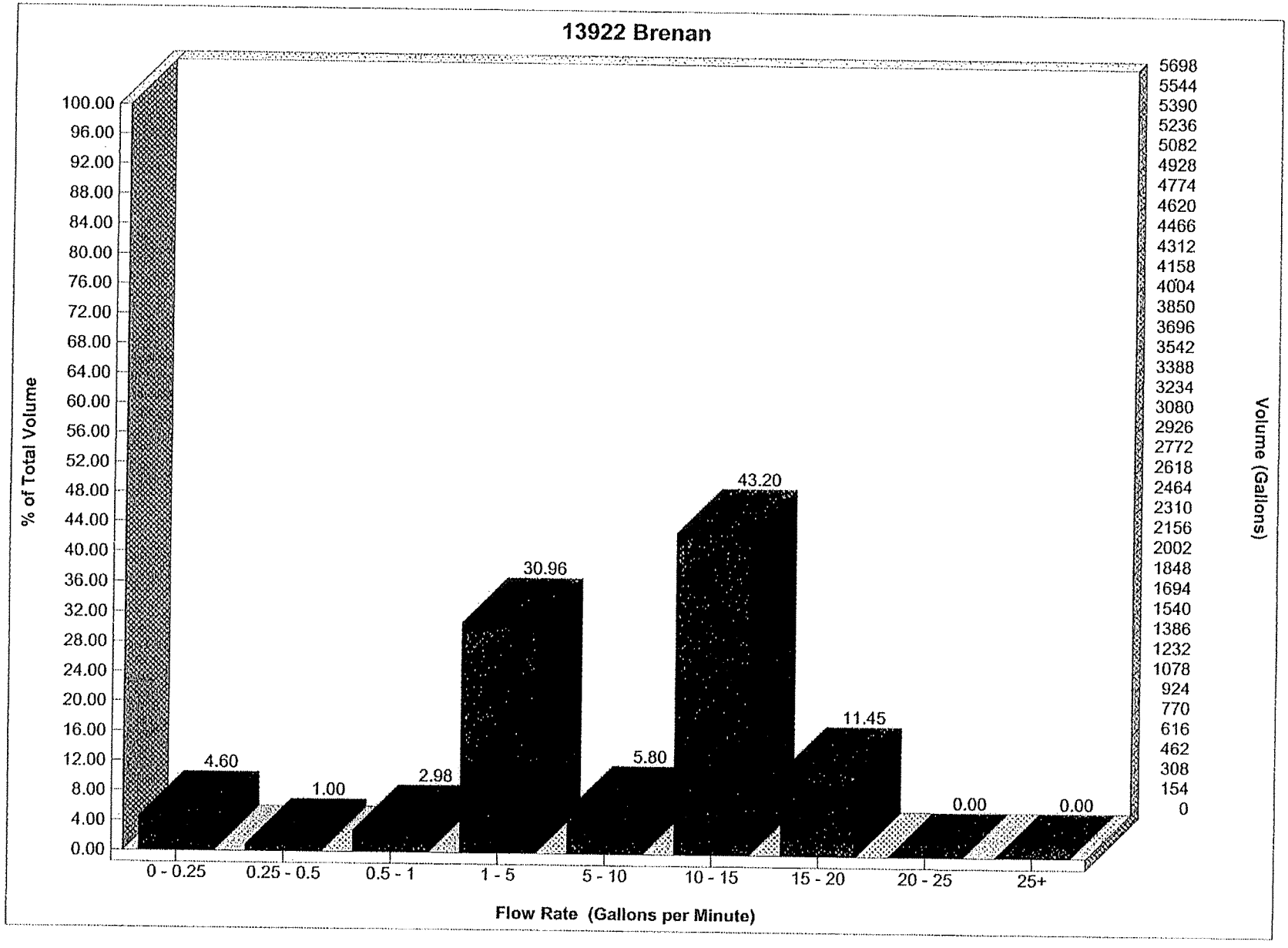
Date/Time	Volume	Maximum	Average	Minimum
09/30/06 10:12:34	21.05	2.89	0.35	0.01
09/30/06 11:12:34	20.51	2.52	0.34	0.01
09/30/06 12:12:34	14.19	2.70	0.24	0.01
09/30/06 13:12:34	17.30	3.08	0.29	0.01
09/30/06 14:12:34	10.45	2.26	0.17	0.01
09/30/06 15:12:34	13.34	2.95	0.22	0.02
09/30/06 16:12:34	18.09	2.03	0.30	0.01
09/30/06 17:12:34	11.53	1.69	0.19	0.02
09/30/06 18:12:34	7.07	1.94	0.12	0.02
09/30/06 19:12:34	15.29	4.58	0.25	0.02
09/30/06 20:12:34	21.96	2.72	0.37	0.02
09/30/06 21:12:34	25.16	3.33	0.42	0.02
09/30/06 22:12:34	5.75	0.48	0.10	0.02
09/30/06 23:12:34	15.36	3.33	0.26	0.02
10/01/06 00:12:34	33.14	5.25	0.55	0.01
10/01/06 01:12:34	3.32	0.12	0.05	0.02
10/01/06 02:12:34	3.45	0.12	0.06	0.02
10/01/06 03:12:34	3.67	0.12	0.06	0.01
10/01/06 04:12:34	16.24	3.16	0.27	0.00
10/01/06 05:12:34	3.53	0.11	0.06	0.01
10/01/06 06:12:34	5.50	1.71	0.09	0.02
10/01/06 07:12:34	195.31	18.55	3.26	0.03
10/01/06 08:12:34	623.27	13.75	10.39	4.49
10/01/06 09:12:34	122.28	12.66	2.04	0.00
10/01/06 10:12:34	11.77	1.94	0.20	0.01
10/01/06 11:12:34	27.27	3.10	0.46	0.00
10/01/06 12:12:34	10.80	3.52	0.18	0.00
10/01/06 13:12:34	5.43	2.52	0.09	0.01
10/01/06 14:12:34	13.83	3.61	0.23	0.01
10/01/06 15:12:34	2.40	0.45	0.04	0.01
10/01/06 16:12:34	5.14	0.75	0.09	0.01
10/01/06 17:12:34	15.78	4.00	0.26	0.01
10/01/06 18:12:34	4.64	1.88	0.08	0.01
10/01/06 19:12:34	13.05	3.71	0.22	0.00
10/01/06 20:12:34	14.14	2.39	0.24	0.01
10/01/06 21:12:34	3.12	0.34	0.05	0.00
10/01/06 22:12:34	12.57	2.26	0.21	0.01
10/01/06 23:12:34	2.22	0.61	0.04	0.00
10/02/06 00:12:34	45.72	3.79	0.76	0.00
10/02/06 01:12:34	0.94	0.07	0.02	0.00
10/02/06 02:12:34	0.98	0.08	0.02	0.00
10/02/06 03:12:34	0.80	0.06	0.01	0.00
10/02/06 04:12:34	14.75	3.96	0.25	0.00
10/02/06 05:12:34	1.39	0.08	0.02	0.00
10/02/06 06:12:34	5.47	2.10	0.09	0.00
10/02/06 07:12:34	170.40	15.97	2.84	0.01
10/02/06 08:12:34	608.65	13.99	10.14	4.33
10/02/06 09:12:34	134.53	13.46	2.24	0.01
10/02/06 10:12:34	8.11	1.87	0.14	0.01
10/02/06 11:12:34	14.05	1.17	0.23	0.00
10/02/06 12:12:34	13.35	3.46	0.22	0.00
10/02/06 13:12:34	8.25	1.99	0.14	0.00
10/02/06 14:12:34	15.23	2.32	0.25	0.01
10/02/06 15:12:34	14.69	4.12	0.25	0.01
10/02/06 16:12:34	13.98	1.48	0.23	0.00
10/02/06 17:12:34	15.00	2.70	0.25	0.01
10/02/06 18:12:34	1.64	0.08	0.03	0.00
10/02/06 19:12:34	32.61	4.58	0.54	0.01
10/02/06 20:12:34	12.66	2.30	0.21	0.01
10/02/06 21:12:34	9.53	1.18	0.16	0.01

Date/Time	Volume	Maximum	Average	Minimum
10/02/06 22:12:34	2.92	0.50	0.05	0.00
10/02/06 23:12:34	25.66	2.37	0.43	0.00
10/03/06 00:12:34	14.23	3.96	0.24	0.00
10/03/06 01:12:34	5.84	2.48	0.10	0.00
10/03/06 02:12:34	0.67	0.15	0.01	0.00
10/03/06 03:12:34	0.57	0.06	0.01	0.00
10/03/06 04:12:34	22.76	3.77	0.38	0.00
10/03/06 05:12:34	0.71	0.11	0.01	0.00
10/03/06 06:12:34	4.96	2.25	0.08	0.00
10/03/06 07:12:34	6.34	2.08	0.11	0.00
10/03/06 08:12:34	25.81	2.27	0.43	0.01
10/03/06 09:12:34	10.06	1.66	0.17	0.01
10/03/06 10:12:34	13.53	3.23	0.23	0.02

Data Summary

Cumulative Volume	5,696.18
Maximum Volume	623.27
Maximum Flow Rate	18.55
Average Flow Rate	0.58
Minimum Flow Rate	0.00


13922 Brenan
623.20
607.62
592.04
576.46
560.88
545.30
529.72
514.14
498.56
482.98
467.40
451.82
436.24
420.66
405.08
389.50
373.92
358.34
342.76
327.18
311.60
296.02
280.44
264.86
249.28
233.70
218.12
202.54
186.96
171.38
155.80
140.22
124.64
109.06
93.48
77.90
62.32
46.74
31.16
15.58
0.00
Volume (Gallons)
9/26/2006 2:12:34 PM to 10/3/2006 10:12:34 AM


13922 Brenan
% of Total Volume
100.00
96.00
92.00
88.00
84.00
80.00
76.00
72.00
68.00
64.00
60.00
56.00
52.00
48.00
44.00
40.00
36.00
32.00
28.00
24.00
20.00
16.00
12.00
8.00
4.00
0.00
4.60
1.00
2.98
30.96
5.80
43.20
11.45
0.00
0.00
0 - 0.25
0.25 - 0.5
0.5 - 1
1 - 5
5 - 10
10 - 15
15 - 20
20 - 25
25+
Flow Rate (Gallons per Minute)
Volume (Gallons)
5698
5544
5390
5236
5082
4928
4774
4620
4466
4312
4158
4004
3850
3696
3542
3388
3234
3080
2926
2772
2618
2464
2310
2156
2002
1848
1694
1540
1386
1232
1078
924
770
616
462
308
154
0

Data File Name C:\PROGRAMF\MMV30\TUSTINHO.MDB

Flow Report

Location Information

ID	2
Name	City of Tustin
Address	13901 Holt
City	Tustin
State/Prov	CA
Postal Code	
Phone	
Notes	

Meter Information

Make	Badger
Model	Recordall PD
Size	Model 25
Unit	Gallons

Grid Interval	3,600	Seconds
Max-Min Interval	60	Seconds

Date/Time	Volume	Maximum	Average	Minimum
09/26/06 14:23:11	14.48	1.87	0.24	0.21
09/26/06 15:23:11	18.94	2.64	0.32	0.21
09/26/06 16:23:11	119.31	6.59	1.99	0.21
09/26/06 17:23:11	15.44	2.10	0.26	0.20
09/26/06 18:23:11	12.46	0.21	0.21	0.20
09/26/06 19:23:11	61.36	7.07	1.02	0.20
09/26/06 20:23:11	31.26	4.37	0.52	0.21
09/26/06 21:23:11	12.77	0.22	0.21	0.21
09/26/06 22:23:11	16.79	2.31	0.28	0.21
09/26/06 23:23:11	13.23	0.27	0.22	0.21
09/27/06 00:23:11	12.85	0.22	0.21	0.21
09/27/06 01:23:11	12.84	0.22	0.21	0.21
09/27/06 02:23:11	12.91	0.22	0.22	0.21
09/27/06 03:23:11	12.86	0.22	0.21	0.21
09/27/06 04:23:11	12.73	0.22	0.21	0.21
09/27/06 05:23:11	12.36	0.21	0.21	0.19
09/27/06 06:23:11	11.98	0.21	0.20	0.19
09/27/06 07:23:11	77.21	6.94	1.29	0.19
09/27/06 08:23:11	150.18	12.65	2.50	0.22
09/27/06 09:23:11	29.47	1.86	0.49	0.20
09/27/06 10:23:11	15.38	2.21	0.26	0.21
09/27/06 11:23:11	15.68	2.54	0.26	0.21
09/27/06 12:23:11	14.10	0.83	0.23	0.20
09/27/06 13:23:11	16.97	2.83	0.28	0.20
09/27/06 14:23:11	16.08	1.19	0.27	0.19
09/27/06 15:23:11	20.41	1.12	0.34	0.19
09/27/06 16:23:11	115.25	6.44	1.92	0.20
09/27/06 17:23:11	19.34	1.42	0.32	0.20
09/27/06 18:23:11	73.51	5.00	1.23	0.19
09/27/06 19:23:11	46.62	4.89	0.78	0.20
09/27/06 20:23:11	52.81	1.99	0.88	0.19
09/27/06 21:23:11	24.67	2.00	0.41	0.19

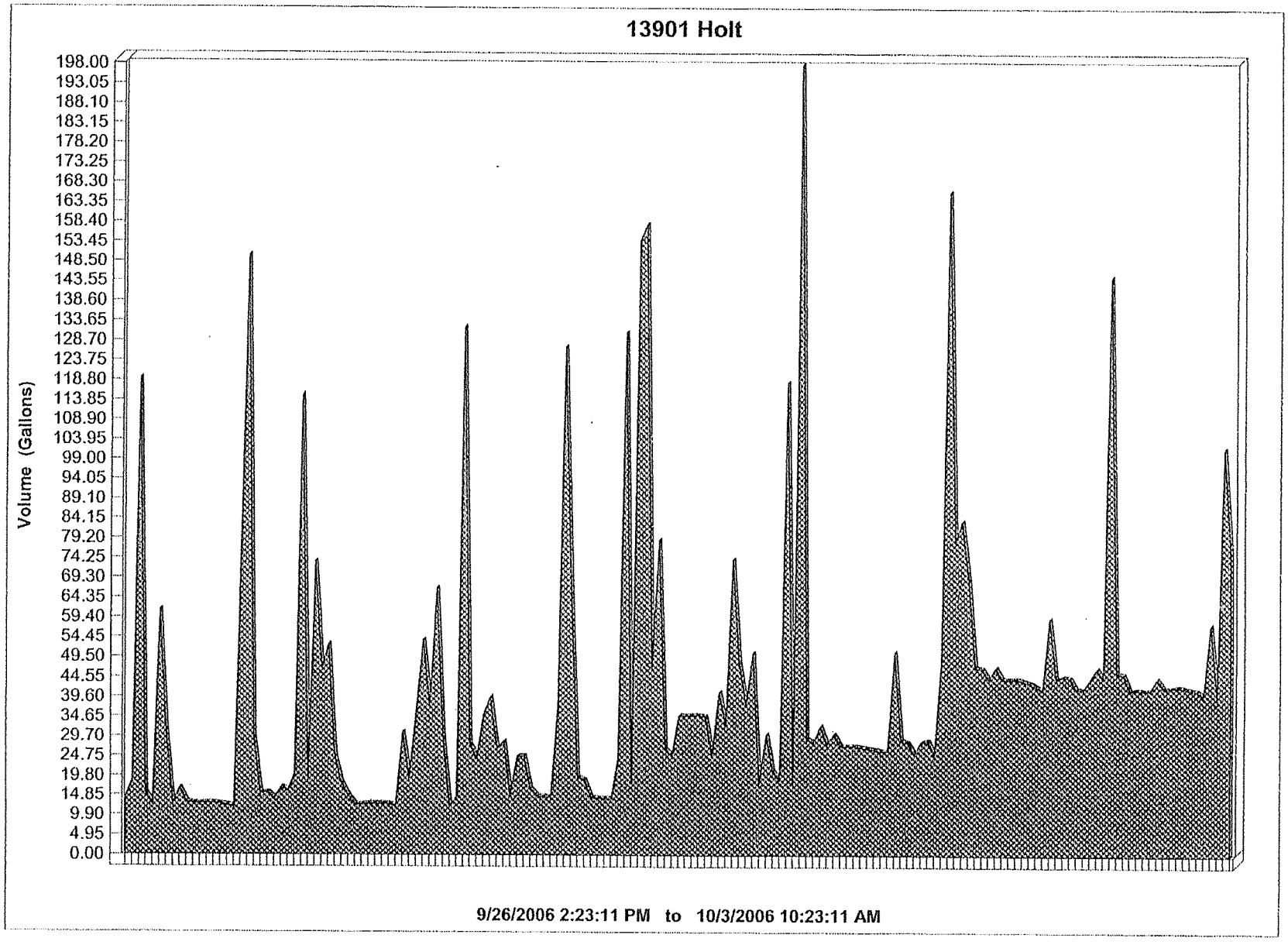
Date/Time	Volume	Maximum	Average	Minimum
09/27/06 22:23:11	18.07	1.42	0.30	0.19
09/27/06 23:23:11	14.71	1.88	0.25	0.20
09/28/06 00:23:11	12.56	0.21	0.21	0.20
09/28/06 01:23:11	12.66	0.21	0.21	0.21
09/28/06 02:23:11	12.84	0.22	0.21	0.21
09/28/06 03:23:11	12.77	0.22	0.21	0.21
09/28/06 04:23:11	12.78	0.22	0.21	0.21
09/28/06 05:23:11	12.64	0.22	0.21	0.20
09/28/06 06:23:11	12.25	0.21	0.20	0.19
09/28/06 07:23:11	30.78	6.01	0.51	0.19
09/28/06 08:23:11	19.19	2.19	0.32	0.19
09/28/06 09:23:11	36.38	3.99	0.61	0.21
09/28/06 10:23:11	53.89	2.34	0.90	0.20
09/28/06 11:23:11	37.44	7.24	0.62	0.20
09/28/06 12:23:11	66.90	5.05	1.12	0.21
09/28/06 13:23:11	29.51	3.81	0.49	0.20
09/28/06 14:23:11	12.37	0.21	0.21	0.20
09/28/06 15:23:11	14.64	2.57	0.24	0.20
09/28/06 16:23:11	132.36	6.85	2.21	0.20
09/28/06 17:23:11	27.79	3.85	0.46	0.20
09/28/06 18:23:11	24.38	2.24	0.41	0.20
09/28/06 19:23:11	35.33	2.55	0.59	0.19
09/28/06 20:23:11	39.75	2.48	0.66	0.23
09/28/06 21:23:11	27.02	3.42	0.45	0.23
09/28/06 22:23:11	28.63	2.86	0.48	0.23
09/28/06 23:23:11	15.35	0.47	0.26	0.24
09/29/06 00:23:11	24.93	2.43	0.41	0.24
09/29/06 01:23:11	24.97	1.47	0.42	0.23
09/29/06 02:23:11	16.81	1.48	0.28	0.24
09/29/06 03:23:11	14.76	0.25	0.25	0.24
09/29/06 04:23:11	14.73	0.25	0.25	0.23
09/29/06 05:23:11	14.51	0.25	0.24	0.23
09/29/06 06:23:11	37.06	6.05	0.62	0.22
09/29/06 07:23:11	127.32	7.59	2.12	0.23
09/29/06 08:23:11	65.43	4.95	1.09	0.23
09/29/06 09:23:11	19.58	2.51	0.33	0.24
09/29/06 10:23:11	19.02	2.44	0.32	0.24
09/29/06 11:23:11	14.56	0.25	0.24	0.23
09/29/06 12:23:11	14.34	0.25	0.24	0.23
09/29/06 13:23:11	14.29	0.24	0.24	0.23
09/29/06 14:23:11	14.20	0.25	0.24	0.23
09/29/06 15:23:11	24.53	2.00	0.41	0.23
09/29/06 16:23:11	130.89	6.53	2.18	0.23
09/29/06 17:23:11	18.20	1.94	0.30	0.23
09/29/06 18:23:11	154.01	6.06	2.57	0.23
09/29/06 19:23:11	158.09	5.35	2.63	0.22
09/29/06 20:23:11	47.44	7.11	0.79	0.21
09/29/06 21:23:11	79.01	7.14	1.32	0.21
09/29/06 22:23:11	26.77	1.42	0.45	0.21
09/29/06 23:23:11	25.19	2.41	0.42	0.22
09/30/06 00:23:11	35.23	0.60	0.59	0.57
09/30/06 01:23:11	35.21	0.59	0.59	0.57
09/30/06 02:23:11	35.34	0.60	0.59	0.57
09/30/06 03:23:11	35.27	0.59	0.59	0.58
09/30/06 04:23:11	34.95	0.59	0.58	0.57
09/30/06 05:23:11	25.16	1.70	0.42	0.22
09/30/06 06:23:11	41.11	1.08	0.69	0.22
09/30/06 07:23:11	32.90	6.56	0.55	0.21
09/30/06 08:23:11	74.26	6.22	1.24	0.22
09/30/06 09:23:11	48.11	3.37	0.80	0.22

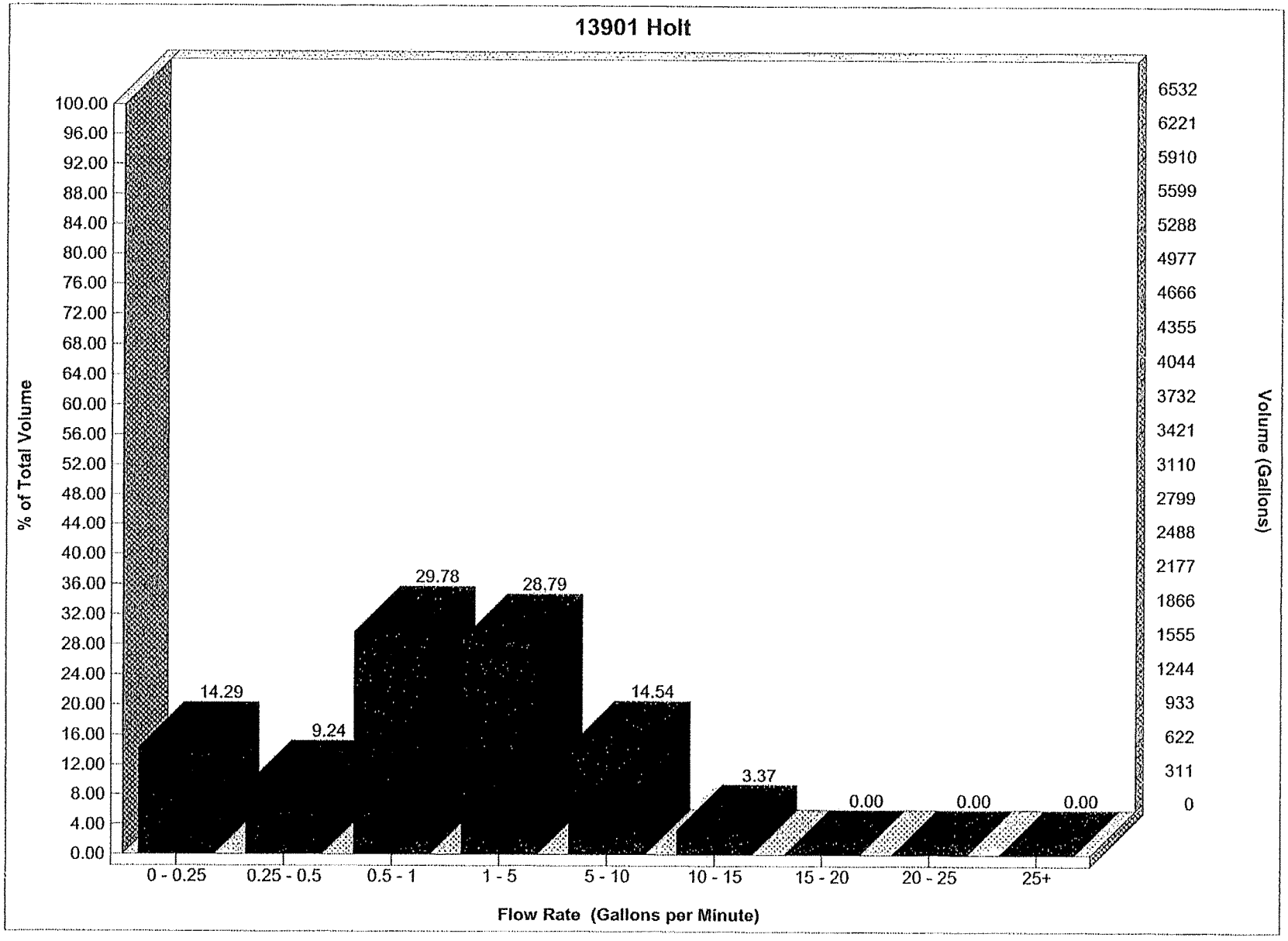
Date/Time	Volume	Maximum	Average	Minimum
09/30/06 10:23:11	38.12	3.50	0.63	0.21
09/30/06 11:23:11	50.85	4.92	0.85	0.21
09/30/06 12:23:11	18.13	2.39	0.30	0.21
09/30/06 13:23:11	30.55	3.69	0.51	0.21
09/30/06 14:23:11	21.27	1.40	0.35	0.21
09/30/06 15:23:11	18.95	2.46	0.32	0.20
09/30/06 16:23:11	118.43	6.40	1.97	0.21
09/30/06 17:23:11	18.37	2.61	0.31	0.21
09/30/06 18:23:11	198.16	13.48	3.30	0.49
09/30/06 19:23:11	29.32	0.66	0.49	0.48
09/30/06 20:23:11	28.56	0.48	0.48	0.47
09/30/06 21:23:11	32.63	3.69	0.54	0.46
09/30/06 22:23:11	28.00	0.51	0.47	0.46
09/30/06 23:23:11	30.67	2.49	0.51	0.46
10/01/06 00:23:11	27.62	0.47	0.46	0.45
10/01/06 01:23:11	27.53	0.46	0.46	0.45
10/01/06 02:23:11	27.64	0.47	0.46	0.45
10/01/06 03:23:11	27.31	0.46	0.46	0.45
10/01/06 04:23:11	27.03	0.45	0.45	0.44
10/01/06 05:23:11	26.70	0.45	0.44	0.43
10/01/06 06:23:11	26.40	0.45	0.44	0.43
10/01/06 07:23:11	26.35	0.44	0.44	0.43
10/01/06 08:23:11	51.12	7.55	0.85	0.42
10/01/06 09:23:11	29.18	2.00	0.49	0.43
10/01/06 10:23:11	28.51	2.08	0.47	0.43
10/01/06 11:23:11	25.65	0.43	0.43	0.43
10/01/06 12:23:11	28.73	2.61	0.48	0.42
10/01/06 13:23:11	29.07	1.68	0.49	0.42
10/01/06 14:23:11	25.45	0.43	0.42	0.41
10/01/06 15:23:11	49.36	3.77	0.82	0.42
10/01/06 16:23:11	166.22	7.13	2.77	1.11
10/01/06 17:23:11	78.64	3.35	1.31	1.11
10/01/06 18:23:11	83.90	1.41	1.40	1.39
10/01/06 19:23:11	69.44	3.41	1.16	0.75
10/01/06 20:23:11	47.37	2.15	0.79	0.74
10/01/06 21:23:11	47.08	3.11	0.79	0.74
10/01/06 22:23:11	44.44	0.75	0.74	0.73
10/01/06 23:23:11	47.37	2.62	0.79	0.74
10/02/06 00:23:11	44.54	0.75	0.74	0.73
10/02/06 01:23:11	44.45	0.75	0.74	0.74
10/02/06 02:23:11	44.63	0.75	0.74	0.74
10/02/06 03:23:11	44.12	0.74	0.74	0.73
10/02/06 04:23:11	43.61	0.73	0.73	0.71
10/02/06 05:23:11	42.69	0.72	0.71	0.69
10/02/06 06:23:11	41.71	0.71	0.69	0.68
10/02/06 07:23:11	59.69	6.98	1.00	0.67
10/02/06 08:23:11	44.62	2.20	0.74	0.70
10/02/06 09:23:11	45.17	2.41	0.75	0.70
10/02/06 10:23:11	44.86	2.75	0.75	0.70
10/02/06 11:23:11	42.05	0.71	0.70	0.70
10/02/06 12:23:11	41.99	0.70	0.70	0.70
10/02/06 13:23:11	44.54	2.96	0.74	0.70
10/02/06 14:23:11	47.22	3.14	0.79	0.69
10/02/06 15:23:11	44.68	3.02	0.75	0.70
10/02/06 16:23:11	145.00	6.95	2.42	0.70
10/02/06 17:23:11	46.02	2.22	0.77	0.70
10/02/06 18:23:11	45.66	1.41	0.76	0.69
10/02/06 19:23:11	41.73	0.91	0.70	0.69
10/02/06 20:23:11	41.97	0.98	0.70	0.69
10/02/06 21:23:11	41.66	0.70	0.69	0.69

Date/Time	Volume	Maximum	Average	Minimum
10/02/06 22:23:11	41.79	0.70	0.70	0.69
10/02/06 23:23:11	44.69	2.85	0.75	0.70
10/03/06 00:23:11	42.30	0.71	0.70	0.70
10/03/06 01:23:11	42.33	0.71	0.71	0.70
10/03/06 02:23:11	42.73	0.72	0.71	0.71
10/03/06 03:23:11	42.39	0.71	0.71	0.70
10/03/06 04:23:11	42.02	0.71	0.70	0.69
10/03/06 05:23:11	41.59	0.72	0.69	0.68
10/03/06 06:23:11	40.73	0.69	0.68	0.66
10/03/06 07:23:11	58.11	6.88	0.97	0.63
10/03/06 08:23:11	40.06	0.69	0.67	0.64
10/03/06 09:23:11	102.29	6.73	1.71	0.67
10/03/06 10:23:11	75.93	3.90	1.26	0.67

Data Summary

Cumulative Volume	6,813.17
Maximum Volume	198.16
Maximum Flow Rate	13.48
Average Flow Rate	0.69
Minimum Flow Rate	0.19


13901 Holt
Volume (Gallons)
198.00
193.05
188.10
183.15
178.20
173.25
168.30
163.35
158.40
153.45
148.50
143.55
138.60
133.65
128.70
123.75
118.80
113.85
108.90
103.95
99.00
94.05
89.10
84.15
79.20
74.25
69.30
64.35
59.40
54.45
49.50
44.55
39.60
34.65
29.70
24.75
19.80
14.85
9.90
4.95
0.00
9/26/2006 2:23:11 PM to 10/3/2006 10:23:11 AM


13901 Holt
% of Total Volume
100.00
96.00
92.00
88.00
84.00
80.00
76.00
72.00
68.00
64.00
60.00
56.00
52.00
48.00
44.00
40.00
36.00
32.00
28.00
24.00
20.00
16.00
12.00
8.00
4.00
0.00
14.29
9.24
29.78
28.79
14.54
3.37
0.00
0.00
0.00
0 - 0.25
0.25 - 0.5
0.5 - 1
1 - 5
5 - 10
10 - 15
15 - 20
20 - 25
25+
Flow Rate (Gallons per Minute)
Volume (Gallons)
6532
6221
5910
5599
5288
4977
4666
4355
4044
3732
3421
3110
2799
2488
2177
1866
1555
1244
933
622
311
0

Data File Name C:\PROGRAMF\MMV30\TUSTINPS.MDB

Flow Report

Location Information

ID 1
Name City of Tustin
Address 13771 Pasadena
City Tustin
State/Prov CA
Postal Code
Phone
Notes

Meter Information

Make Badger
Model Recordall PD
Size Model 25
Unit Gallons

Grid Interval 3,600 Seconds
Max-Min Interval 60 Seconds

Date/Time	Volume	Maximum	Average	Minimum
09/26/06 15:14:12	10.69	2.98	0.18	0.01
09/26/06 16:14:12	9.86	2.67	0.16	0.01
09/26/06 17:14:12	5.76	1.84	0.10	0.01
09/26/06 18:14:12	0.79	0.02	0.01	0.01
09/26/06 19:14:12	19.70	2.82	0.33	0.01
09/26/06 20:14:12	35.07	2.97	0.58	0.01
09/26/06 21:14:12	14.16	2.79	0.24	0.01
09/26/06 22:14:12	9.42	2.05	0.16	0.01
09/26/06 23:14:12	3.94	1.77	0.07	0.01
09/27/06 00:14:12	16.73	2.85	0.28	0.01
09/27/06 01:14:12	3.96	0.07	0.07	0.05
09/27/06 02:14:12	3.80	0.07	0.06	0.05
09/27/06 03:14:12	3.17	0.06	0.05	0.04
09/27/06 04:14:12	2.31	0.05	0.04	0.02
09/27/06 05:14:12	5.97	1.97	0.10	0.01
09/27/06 06:14:12	4.34	1.73	0.07	0.01
09/27/06 07:14:12	10.62	2.34	0.18	0.01
09/27/06 08:14:12	12.68	2.76	0.21	0.01
09/27/06 09:14:12	32.35	4.23	0.54	0.03
09/27/06 10:14:12	13.81	3.42	0.23	0.02
09/27/06 11:14:12	3.02	0.12	0.05	0.04
09/27/06 12:14:12	3.13	0.06	0.05	0.05
09/27/06 13:14:12	17.81	2.08	0.30	0.04
09/27/06 14:14:12	24.73	3.29	0.41	0.28
09/27/06 15:14:12	26.23	2.45	0.44	0.27
09/27/06 16:14:12	24.59	3.26	0.41	0.33
09/27/06 17:14:12	17.31	2.13	0.29	0.01
09/27/06 18:14:12	18.35	2.68	0.31	0.01
09/27/06 19:14:12	48.81	2.87	0.81	0.01
09/27/06 20:14:12	1.12	0.03	0.02	0.01
09/27/06 21:14:12	12.94	2.12	0.22	0.01
09/27/06 22:14:12	2.67	1.51	0.05	0.01

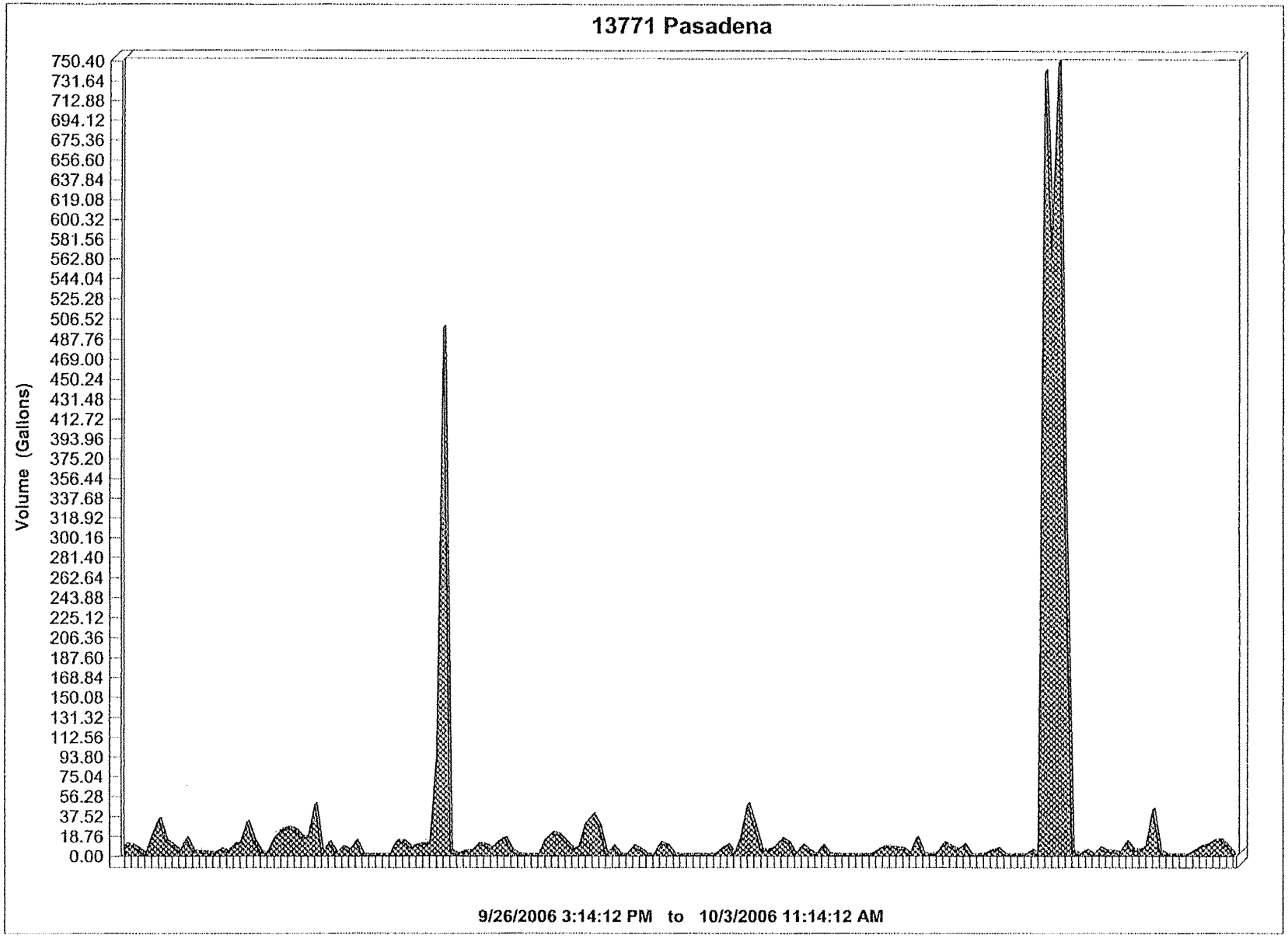
Date/Time	Volume	Maximum	Average	Minimum
09/27/06 23:14:12	8.58	2.16	0.14	0.01
09/28/06 00:14:12	4.81	2.14	0.08	0.01
09/28/06 01:14:12	14.12	2.14	0.23	0.01
09/28/06 02:14:12	1.01	0.04	0.02	0.01
09/28/06 03:14:12	0.99	0.04	0.02	0.01
09/28/06 04:14:12	0.96	0.03	0.02	0.01
09/28/06 05:14:12	0.98	0.03	0.02	0.01
09/28/06 06:14:12	0.96	0.03	0.02	0.01
09/28/06 07:14:12	13.90	2.65	0.23	0.01
09/28/06 08:14:12	14.08	3.03	0.23	0.01
09/28/06 09:14:12	7.89	1.96	0.13	0.01
09/28/06 10:14:12	10.18	2.84	0.17	0.01
09/28/06 11:14:12	11.11	4.40	0.19	0.01
09/28/06 12:14:12	12.34	2.03	0.21	0.01
09/28/06 13:14:12	94.98	16.61	1.58	0.01
09/28/06 14:14:12	499.08	17.32	8.32	0.02
09/28/06 15:14:12	4.42	2.63	0.07	0.02
09/28/06 16:14:12	1.52	0.16	0.03	0.02
09/28/06 17:14:12	4.39	2.95	0.07	0.02
09/28/06 18:14:12	4.73	2.83	0.08	0.01
09/28/06 19:14:12	11.09	3.03	0.19	0.02
09/28/06 20:14:12	10.18	2.90	0.17	0.01
09/28/06 21:14:12	7.18	2.32	0.12	0.01
09/28/06 22:14:12	13.86	2.80	0.23	0.01
09/28/06 23:14:12	16.94	2.71	0.28	0.01
09/29/06 00:14:12	4.94	2.19	0.08	0.01
09/29/06 01:14:12	1.13	0.04	0.02	0.01
09/29/06 02:14:12	1.05	0.03	0.02	0.01
09/29/06 03:14:12	1.08	0.04	0.02	0.01
09/29/06 04:14:12	1.05	0.03	0.02	0.01
09/29/06 05:14:12	15.91	1.94	0.26	0.01
09/29/06 06:14:12	21.92	3.65	0.37	0.01
09/29/06 07:14:12	19.51	3.17	0.32	0.01
09/29/06 08:14:12	12.99	2.44	0.22	0.01
09/29/06 09:14:12	5.80	2.12	0.10	0.01
09/29/06 10:14:12	9.16	3.99	0.15	0.01
09/29/06 11:14:12	31.39	2.17	0.52	0.02
09/29/06 12:14:12	39.00	2.86	0.65	0.01
09/29/06 13:14:12	27.46	2.21	0.46	0.01
09/29/06 14:14:12	1.26	0.11	0.02	0.01
09/29/06 15:14:12	8.97	2.95	0.15	0.02
09/29/06 16:14:12	1.18	0.03	0.02	0.01
09/29/06 17:14:12	1.13	0.03	0.02	0.01
09/29/06 18:14:12	9.14	3.03	0.15	0.02
09/29/06 19:14:12	5.84	2.16	0.10	0.01
09/29/06 20:14:12	1.10	0.03	0.02	0.01
09/29/06 21:14:12	1.13	0.03	0.02	0.01
09/29/06 22:14:12	12.15	3.89	0.20	0.01
09/29/06 23:14:12	9.60	2.49	0.16	0.01
09/30/06 00:14:12	1.15	0.05	0.02	0.01
09/30/06 01:14:12	1.05	0.03	0.02	0.01
09/30/06 02:14:12	1.07	0.03	0.02	0.01
09/30/06 03:14:12	1.07	0.04	0.02	0.01
09/30/06 04:14:12	1.05	0.03	0.02	0.01
09/30/06 05:14:12	1.05	0.03	0.02	0.01
09/30/06 06:14:12	0.99	0.04	0.02	0.01
09/30/06 07:14:12	6.81	2.13	0.11	0.01
09/30/06 08:14:12	10.22	2.13	0.17	0.01
09/30/06 09:14:12	1.03	0.03	0.02	0.01
09/30/06 10:14:12	17.93	2.23	0.30	0.01

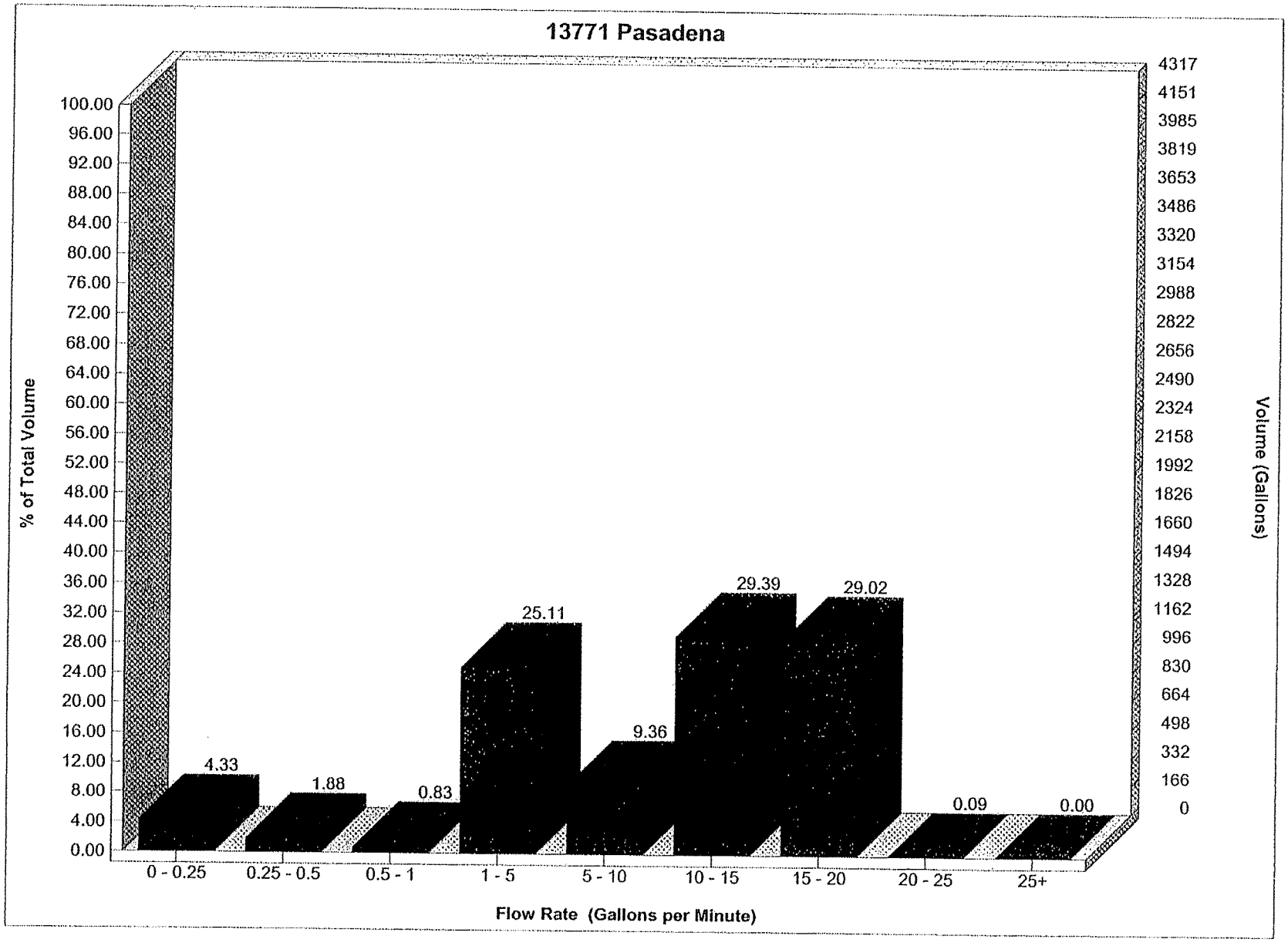
Date/Time	Volume	Maximum	Average	Minimum
09/30/06 11:14:12	49.11	3.34	0.82	0.01
09/30/06 12:14:12	28.16	2.93	0.47	0.01
09/30/06 13:14:12	5.58	2.95	0.09	0.01
09/30/06 14:14:12	5.34	2.15	0.09	0.01
09/30/06 15:14:12	8.59	2.76	0.14	0.01
09/30/06 16:14:12	16.26	2.92	0.27	0.01
09/30/06 17:14:12	11.88	2.48	0.20	0.01
09/30/06 18:14:12	1.16	0.14	0.02	0.01
09/30/06 19:14:12	10.02	3.04	0.17	0.01
09/30/06 20:14:12	4.54	2.70	0.08	0.01
09/30/06 21:14:12	1.31	0.22	0.02	0.01
09/30/06 22:14:12	9.54	2.99	0.16	0.01
09/30/06 23:14:12	1.24	0.05	0.02	0.01
10/01/06 00:14:12	1.22	0.17	0.02	0.01
10/01/06 01:14:12	1.08	0.04	0.02	0.01
10/01/06 02:14:12	1.00	0.04	0.02	0.01
10/01/06 03:14:12	1.01	0.03	0.02	0.01
10/01/06 04:14:12	1.00	0.04	0.02	0.01
10/01/06 05:14:12	0.97	0.04	0.02	0.01
10/01/06 06:14:12	4.85	1.31	0.08	0.01
10/01/06 07:14:12	8.59	1.10	0.14	0.01
10/01/06 08:14:12	7.99	2.76	0.13	0.01
10/01/06 09:14:12	7.67	2.12	0.13	0.01
10/01/06 10:14:12	6.24	1.30	0.10	0.01
10/01/06 11:14:12	1.06	0.03	0.02	0.01
10/01/06 12:14:12	17.29	2.21	0.29	0.01
10/01/06 13:14:12	1.23	0.07	0.02	0.01
10/01/06 14:14:12	1.12	0.04	0.02	0.01
10/01/06 15:14:12	2.80	1.01	0.05	0.01
10/01/06 16:14:12	12.25	2.34	0.20	0.01
10/01/06 17:14:12	8.81	2.99	0.15	0.01
10/01/06 18:14:12	5.60	2.18	0.09	0.01
10/01/06 19:14:12	10.77	3.03	0.18	0.01
10/01/06 20:14:12	1.07	0.03	0.02	0.01
10/01/06 21:14:12	1.07	0.04	0.02	0.01
10/01/06 22:14:12	2.09	0.49	0.04	0.01
10/01/06 23:14:12	4.89	2.20	0.08	0.01
10/02/06 00:14:12	6.47	2.29	0.11	0.01
10/02/06 01:14:12	1.00	0.03	0.02	0.01
10/02/06 02:14:12	1.01	0.03	0.02	0.01
10/02/06 03:14:12	1.03	0.03	0.02	0.01
10/02/06 04:14:12	1.05	0.03	0.02	0.01
10/02/06 05:14:12	5.36	2.24	0.09	0.01
10/02/06 06:14:12	1.06	0.04	0.02	0.01
10/02/06 07:14:12	741.70	17.37	12.36	0.01
10/02/06 08:14:12	566.41	13.11	9.44	8.08
10/02/06 09:14:12	750.71	14.18	12.51	12.21
10/02/06 10:14:12	309.06	13.48	5.15	0.01
10/02/06 11:14:12	4.38	1.62	0.07	0.02
10/02/06 12:14:12	1.30	0.03	0.02	0.02
10/02/06 13:14:12	5.08	2.18	0.09	0.02
10/02/06 14:14:12	1.23	0.03	0.02	0.02
10/02/06 15:14:12	7.64	3.01	0.13	0.02
10/02/06 16:14:12	4.52	3.28	0.08	0.02
10/02/06 17:14:12	4.26	2.11	0.07	0.02
10/02/06 18:14:12	2.36	1.14	0.04	0.02
10/02/06 19:14:12	13.35	2.96	0.22	0.02
10/02/06 20:14:12	5.51	2.72	0.09	0.02
10/02/06 21:14:12	5.58	2.49	0.09	0.01
10/02/06 22:14:12	9.54	2.99	0.16	0.01

Date/Time	Volume	Maximum	Average	Minimum
10/02/06 23:14:12	44.18	1.69	0.74	0.01
10/03/06 00:14:12	4.05	2.03	0.07	0.01
10/03/06 01:14:12	1.06	0.03	0.02	0.01
10/03/06 02:14:12	1.10	0.07	0.02	0.01
10/03/06 03:14:12	1.03	0.03	0.02	0.01
10/03/06 04:14:12	1.03	0.03	0.02	0.01
10/03/06 05:14:12	4.83	2.19	0.08	0.01
10/03/06 06:14:12	8.67	2.15	0.14	0.01
10/03/06 07:14:12	10.43	3.24	0.17	0.01
10/03/06 08:14:12	14.32	2.67	0.24	0.01
10/03/06 09:14:12	15.41	2.89	0.26	0.01
10/03/06 10:14:12	9.43	2.56	0.16	0.01
10/03/06 11:14:12	1.55	0.46	0.03	0.01

Data Summary

Cumulative Volume	4,308.57
Maximum Volume	750.71
Maximum Flow Rate	17.37
Average Flow Rate	0.44
Minimum Flow Rate	0.01


13771 Pasadena
Volume (Gallons)
750.40
731.64
712.88
694.12
675.36
656.60
637.84
619.08
600.32
581.56
562.80
544.04
525.28
506.52
487.76
469.00
450.24
431.48
412.72
393.96
375.20
356.44
337.68
318.92
300.16
281.40
262.64
243.88
225.12
206.36
187.60
168.84
150.08
131.32
112.56
93.80
75.04
56.28
37.52
18.76
0.00
9/26/2006 3:14:12 PM to 10/3/2006 11:14:12 AM


13771 Pasadena
% of Total Volume
100.00
96.00
92.00
88.00
84.00
80.00
76.00
72.00
68.00
64.00
60.00
56.00
52.00
48.00
44.00
40.00
36.00
32.00
28.00
24.00
20.00
16.00
12.00
8.00
4.00
0.00
4.33
1.88
0.83
25.11
9.36
29.39
29.02
0.09
0.00
0 - 0.25
0.25 - 0.5
0.5 - 1
1 - 5
5 - 10
10 - 15
15 - 20
20 - 25
25+
Flow Rate (Gallons per Minute)
Volume (Gallons)
4317
4151
3985
3819
3653
3486
3320
3154
2988
2822
2656
2490
2324
2158
1992
1826
1660
1494
1328
1162
996
830
664
498
332
166
0

Data File Nam C:\PROGRAMF\MMV30\TUSTINWS.MDB

Flow Report

Location Information

ID 6
Name City of Tustin
Address 13431 White Sand
City
State/Prov
Postal Code
Phone
Notes

Meter Information

Make Badger
Model Recordall PD
Size Model 25
Unit Gallons

Grid Interval 3,600 Seconds
Max-Min Interval 60 Seconds

Date/Time	Volume	Maximum	Average	Minimum
09/26/06 13:16:40	6.46	1.88	0.11	0.00
09/26/06 14:16:40	1.85	0.09	0.03	0.00
09/26/06 15:16:40	2.03	0.08	0.03	0.00
09/26/06 16:16:40	9.39	3.56	0.16	0.00
09/26/06 17:16:40	2.12	0.10	0.04	0.00
09/26/06 18:16:40	2.39	0.09	0.04	0.01
09/26/06 19:16:40	96.19	21.09	1.60	0.00
09/26/06 20:16:40	1.84	0.09	0.03	0.00
09/26/06 21:16:40	2.11	0.11	0.04	0.01
09/26/06 22:16:40	3.29	1.77	0.05	0.00
09/26/06 23:16:40	0.09	0.01	0.00	0.00
09/27/06 00:16:40	0.01	0.00	0.00	0.00
09/27/06 01:16:40	0.58	0.08	0.01	0.00
09/27/06 02:16:40	1.39	1.19	0.02	0.00
09/27/06 03:16:40	1.26	0.10	0.02	0.00
09/27/06 04:16:40	0.77	0.07	0.01	0.00
09/27/06 05:16:40	291.94	19.69	4.87	0.00
09/27/06 06:16:40	583.10	17.22	9.72	0.00
09/27/06 07:16:40	1.07	0.11	0.02	0.00
09/27/06 08:16:40	51.74	2.60	0.86	0.00
09/27/06 09:16:40	2.32	0.14	0.04	0.00
09/27/06 10:16:40	1.71	0.08	0.03	0.00
09/27/06 11:16:40	1.86	0.09	0.03	0.00
09/27/06 12:16:40	34.46	5.06	0.57	0.00
09/27/06 13:16:40	15.78	2.26	0.26	0.00
09/27/06 14:16:40	2.28	0.36	0.04	0.00
09/27/06 15:16:40	1.72	0.09	0.03	0.00
09/27/06 16:16:40	1.65	0.07	0.03	0.00
09/27/06 17:16:40	15.10	2.02	0.25	0.00
09/27/06 18:16:40	19.76	2.90	0.33	0.00
09/27/06 19:16:40	13.30	2.25	0.22	0.00
09/27/06 20:16:40	6.51	2.26	0.11	0.00

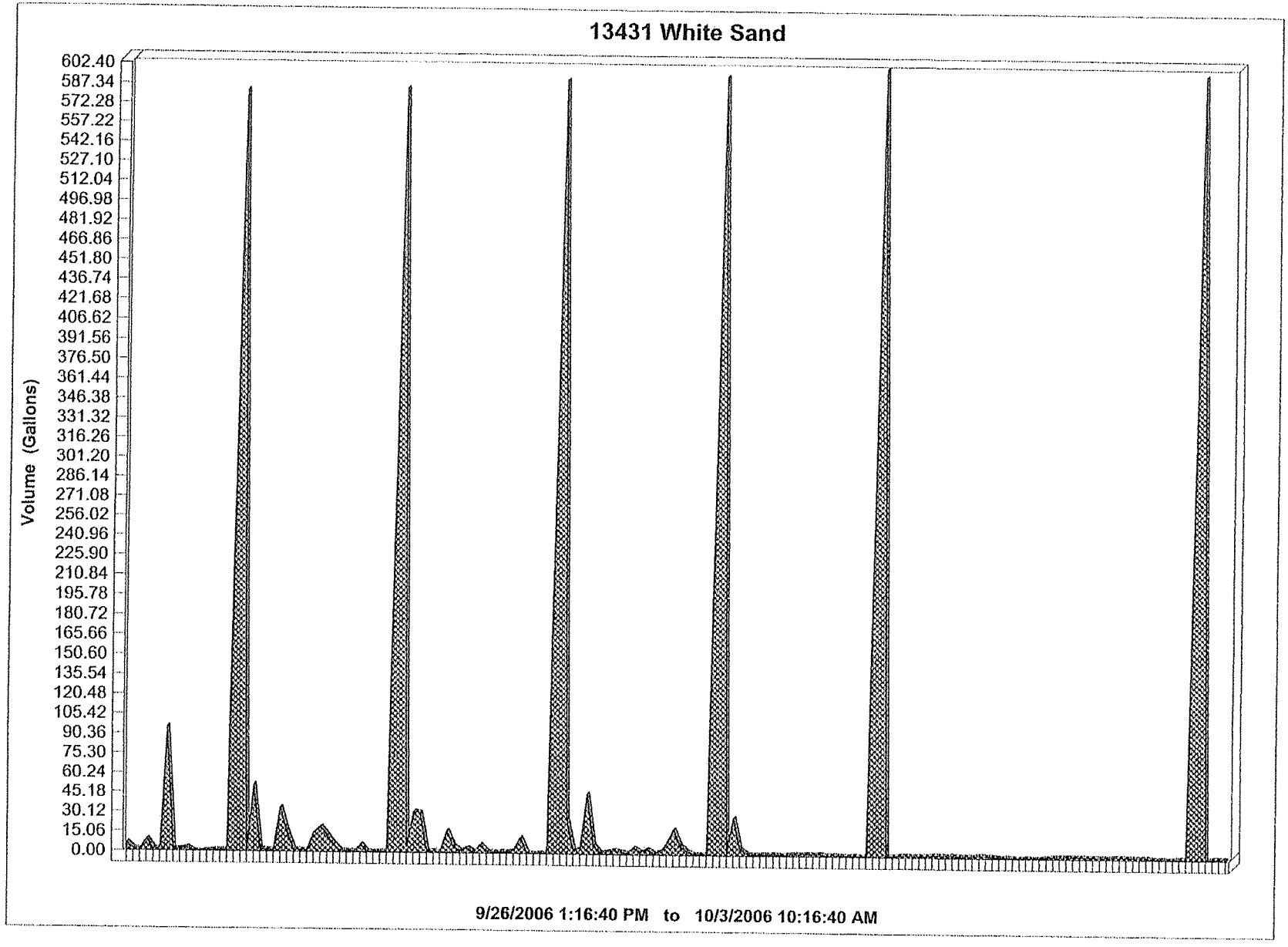
Date/Time	Volume	Maximum	Average	Minimum
09/27/06 21:16:40	1.52	0.09	0.03	0.00
09/27/06 22:16:40	1.26	0.11	0.02	0.00
09/27/06 23:16:40	1.19	0.09	0.02	0.00
09/28/06 00:16:40	6.24	2.13	0.10	0.00
09/28/06 01:16:40	0.94	0.08	0.02	0.00
09/28/06 02:16:40	0.74	0.13	0.01	0.00
09/28/06 03:16:40	1.09	0.09	0.02	0.00
09/28/06 04:16:40	0.89	0.08	0.01	0.00
09/28/06 05:16:40	292.87	19.98	4.88	0.00
09/28/06 06:16:40	585.29	17.25	9.76	0.00
09/28/06 07:16:40	4.77	2.13	0.08	0.00
09/28/06 08:16:40	31.73	2.01	0.53	0.00
09/28/06 09:16:40	30.72	3.24	0.51	0.00
09/28/06 10:16:40	1.87	0.10	0.03	0.00
09/28/06 11:16:40	1.63	0.09	0.03	0.00
09/28/06 12:16:40	1.26	0.07	0.02	0.00
09/28/06 13:16:40	17.31	3.43	0.29	0.00
09/28/06 14:16:40	5.69	1.70	0.09	0.00
09/28/06 15:16:40	1.96	0.57	0.03	0.00
09/28/06 16:16:40	4.34	2.72	0.07	0.00
09/28/06 17:16:40	1.08	0.06	0.02	0.00
09/28/06 18:16:40	6.89	2.96	0.12	0.00
09/28/06 19:16:40	1.66	0.09	0.03	0.00
09/28/06 20:16:40	1.52	0.09	0.03	0.00
09/28/06 21:16:40	1.80	0.09	0.03	0.00
09/28/06 22:16:40	1.55	0.08	0.03	0.00
09/28/06 23:16:40	3.02	1.46	0.05	0.00
09/29/06 00:16:40	12.57	4.88	0.21	0.00
09/29/06 01:16:40	0.92	0.07	0.01	0.00
09/29/06 02:16:40	0.53	0.08	0.01	0.00
09/29/06 03:16:40	0.93	0.08	0.02	0.00
09/29/06 04:16:40	0.97	0.10	0.02	0.00
09/29/06 05:16:40	292.67	20.01	4.88	0.00
09/29/06 06:16:40	592.68	17.44	9.88	0.00
09/29/06 07:16:40	26.62	3.70	0.44	0.00
09/29/06 08:16:40	3.16	0.55	0.05	0.00
09/29/06 09:16:40	4.96	1.91	0.08	0.00
09/29/06 10:16:40	46.41	2.25	0.77	0.00
09/29/06 11:16:40	7.60	2.04	0.13	0.00
09/29/06 12:16:40	1.56	0.08	0.03	0.00
09/29/06 13:16:40	2.48	1.06	0.04	0.00
09/29/06 14:16:40	3.66	1.89	0.06	0.00
09/29/06 15:16:40	2.36	0.94	0.04	0.00
09/29/06 16:16:40	1.59	0.09	0.03	0.00
09/29/06 17:16:40	5.54	2.78	0.09	0.00
09/29/06 18:16:40	2.35	0.08	0.04	0.01
09/29/06 19:16:40	4.49	2.65	0.08	0.00
09/29/06 20:16:40	1.46	0.11	0.02	0.00
09/29/06 21:16:40	3.27	1.46	0.05	0.00
09/29/06 22:16:40	9.32	1.91	0.16	0.00
09/29/06 23:16:40	19.96	3.09	0.33	0.00
09/30/06 00:16:40	7.72	1.64	0.13	0.00
09/30/06 01:16:40	3.09	1.25	0.05	0.00
09/30/06 02:16:40	0.72	0.10	0.01	0.00
09/30/06 03:16:40	1.08	0.08	0.02	0.00
09/30/06 04:16:40	0.63	0.07	0.01	0.00
09/30/06 05:16:40	293.73	20.04	4.89	0.00
09/30/06 06:16:40	595.74	17.42	9.93	0.00
09/30/06 07:16:40	2.97	1.59	0.05	0.00
09/30/06 08:16:40	29.12	2.63	0.49	0.00

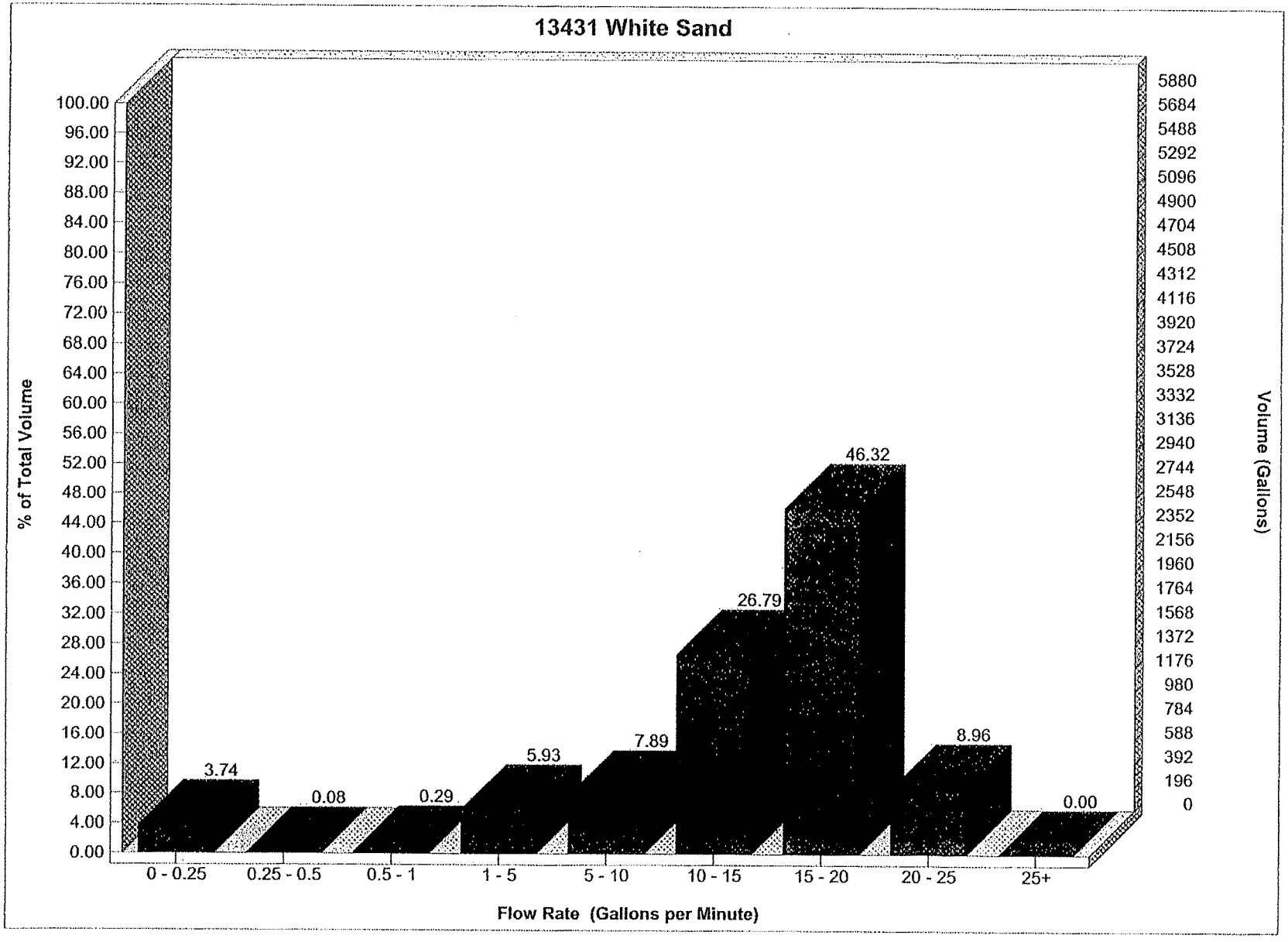
Date/Time	Volume	Maximum	Average	Minimum
09/30/06 09:16:40	5.25	2.07	0.09	0.00
09/30/06 10:16:40	1.64	0.11	0.03	0.00
09/30/06 11:16:40	1.27	0.09	0.02	0.00
09/30/06 12:16:40	1.50	0.08	0.03	0.00
09/30/06 13:16:40	1.41	0.08	0.02	0.00
09/30/06 14:16:40	1.89	0.09	0.03	0.00
09/30/06 15:16:40	1.18	0.08	0.02	0.00
09/30/06 16:16:40	1.55	0.10	0.03	0.00
09/30/06 17:16:40	2.05	0.10	0.03	0.00
09/30/06 18:16:40	1.81	0.09	0.03	0.00
09/30/06 19:16:40	2.23	0.10	0.04	0.00
09/30/06 20:16:40	2.06	0.14	0.03	0.00
09/30/06 21:16:40	2.15	0.11	0.04	0.00
09/30/06 22:16:40	1.45	0.10	0.02	0.00
09/30/06 23:16:40	1.90	0.08	0.03	0.00
10/01/06 00:16:40	1.23	0.13	0.02	0.00
10/01/06 01:16:40	0.85	0.06	0.01	0.00
10/01/06 02:16:40	1.29	0.11	0.02	0.00
10/01/06 03:16:40	0.63	0.07	0.01	0.00
10/01/06 04:16:40	1.16	0.07	0.02	0.00
10/01/06 05:16:40	293.60	20.22	4.89	0.00
10/01/06 06:16:40	602.79	17.63	10.05	0.00
10/01/06 07:16:40	0.94	0.12	0.02	0.00
10/01/06 08:16:40	1.13	0.09	0.02	0.00
10/01/06 09:16:40	1.77	0.10	0.03	0.00
10/01/06 10:16:40	1.88	0.09	0.03	0.00
10/01/06 11:16:40	1.32	0.11	0.02	0.00
10/01/06 12:16:40	1.72	0.10	0.03	0.00
10/01/06 13:16:40	1.49	0.09	0.03	0.00
10/01/06 14:16:40	2.15	0.09	0.04	0.00
10/01/06 15:16:40	2.19	0.09	0.04	0.00
10/01/06 16:16:40	1.81	0.12	0.03	0.00
10/01/06 17:16:40	2.08	0.08	0.04	0.00
10/01/06 18:16:40	1.60	0.09	0.03	0.00
10/01/06 19:16:40	1.77	0.13	0.03	0.00
10/01/06 20:16:40	1.76	0.08	0.03	0.00
10/01/06 21:16:40	2.22	0.11	0.04	0.00
10/01/06 22:16:40	2.02	0.13	0.03	0.00
10/01/06 23:16:40	1.67	0.09	0.03	0.00
10/02/06 00:16:40	0.81	0.10	0.01	0.00
10/02/06 01:16:40	1.30	0.07	0.02	0.00
10/02/06 02:16:40	0.86	0.07	0.01	0.00
10/02/06 03:16:40	0.79	0.06	0.01	0.00
10/02/06 04:16:40	1.00	0.07	0.02	0.00
10/02/06 05:16:40	0.24	0.02	0.00	0.00
10/02/06 06:16:40	0.77	0.09	0.01	0.00
10/02/06 07:16:40	1.66	0.08	0.03	0.00
10/02/06 08:16:40	1.86	0.14	0.03	0.00
10/02/06 09:16:40	2.14	0.08	0.04	0.00
10/02/06 10:16:40	2.04	0.07	0.03	0.01
10/02/06 11:16:40	1.96	0.10	0.03	0.00
10/02/06 12:16:40	2.00	0.09	0.03	0.00
10/02/06 13:16:40	2.08	0.10	0.04	0.00
10/02/06 14:16:40	1.88	0.09	0.03	0.00
10/02/06 15:16:40	1.68	0.10	0.03	0.00
10/02/06 16:16:40	1.62	0.08	0.03	0.00
10/02/06 17:16:40	2.27	0.11	0.04	0.00
10/02/06 18:16:40	2.07	0.10	0.03	0.00
10/02/06 19:16:40	1.83	0.13	0.03	0.00
10/02/06 20:16:40	1.84	0.09	0.03	0.00

Date/Time	Volume	Maximum	Average	Minimum
10/02/06 21:16:40	1.88	0.09	0.03	0.00
10/02/06 22:16:40	1.90	0.10	0.03	0.00
10/02/06 23:16:40	0.85	0.11	0.01	0.00
10/03/06 00:16:40	1.00	0.10	0.02	0.00
10/03/06 01:16:40	0.53	0.06	0.01	0.00
10/03/06 02:16:40	0.72	0.07	0.01	0.00
10/03/06 03:16:40	1.27	0.10	0.02	0.00
10/03/06 04:16:40	0.79	0.07	0.01	0.00
10/03/06 05:16:40	298.55	20.41	4.98	0.00
10/03/06 06:16:40	599.69	17.71	9.99	0.00
10/03/06 07:16:40	0.84	0.13	0.01	0.00
10/03/06 08:16:40	1.67	0.08	0.03	0.00
10/03/06 09:16:40	1.49	0.10	0.03	0.00
10/03/06 10:16:40	1.47	0.09	0.02	0.00

Data Summary

Cumulative Volume	6,075.51
Maximum Volume	602.79
Maximum Flow Rate	21.09
Average Flow Rate	0.61
Minimum Flow Rate	0.00


13431 White Sand
602.40
587.34
572.28
557.22
542.16
527.10
512.04
496.98
481.92
466.86
451.80
436.74
421.68
406.62
391.56
376.50
361.44
346.38
331.32
316.26
301.20
286.14
271.08
256.02
240.96
225.90
210.84
195.78
180.72
165.66
150.60
135.54
120.48
105.42
90.36
75.30
60.24
45.18
30.12
15.06
0.00
Volume (Gallons)
9/26/2006 1:16:40 PM to 10/3/2006 10:16:40 AM


13431 White Sand
% of Total Volume
100.00
96.00
92.00
88.00
84.00
80.00
76.00
72.00
68.00
64.00
60.00
56.00
52.00
48.00
44.00
40.00
36.00
32.00
28.00
24.00
20.00
16.00
12.00
8.00
4.00
0.00
Volume (Gallons)
5880
5684
5488
5292
5096
4900
4704
4508
4312
4116
3920
3724
3528
3332
3136
2940
2744
2548
2352
2156
1960
1764
1568
1372
1176
980
784
588
392
196
0
3.74
0.08
0.29
5.93
7.89
26.79
46.32
8.96
0.00
0 - 0.25
0.25 - 0.5
0.5 - 1
1 - 5
5 - 10
10 - 15
15 - 20
20 - 25
25+
Flow Rate (Gallons per Minute)

Data File Name C:\PROGRAMF\MMV30\TUSTINBO.MDB

Flow Report

Location Information

ID 5
Name City of Tustin
Address 13162 Bow
City Tustin
State/Prov
Postal Code
Phone
Notes

Meter Information

Make Badger
Model Recordall PD
Size Model 70
Unit Gallons

Grid Interval 3,600 Seconds
Max-Min Interval 60 Seconds

Date/Time	Volume	Maximum	Average	Minimum
09/26/06 13:42:20	14.34	2.67	0.24	0.00
09/26/06 14:42:20	17.03	1.80	0.28	0.03
09/26/06 15:42:20	6.35	1.53	0.11	0.00
09/26/06 16:42:20	13.56	1.63	0.23	0.04
09/26/06 17:42:20	9.47	1.07	0.16	0.07
09/26/06 18:42:20	17.00	2.35	0.28	0.06
09/26/06 19:42:20	16.06	1.45	0.27	0.03
09/26/06 20:42:20	8.10	0.35	0.14	0.05
09/26/06 21:42:20	2.88	1.08	0.05	0.00
09/26/06 22:42:20	2.34	1.39	0.04	0.00
09/26/06 23:42:20	125.48	7.89	2.09	0.00
09/27/06 00:42:20	120.15	7.55	2.00	0.00
09/27/06 01:42:20	0.01	0.00	0.00	0.00
09/27/06 02:42:20	0.01	0.00	0.00	0.00
09/27/06 03:42:20	0.01	0.00	0.00	0.00
09/27/06 04:42:20	0.01	0.00	0.00	0.00
09/27/06 05:42:20	32.63	3.45	0.54	0.00
09/27/06 06:42:20	23.14	2.52	0.39	0.00
09/27/06 07:42:20	32.61	1.54	0.54	0.04
09/27/06 08:42:20	9.13	1.41	0.15	0.06
09/27/06 09:42:20	7.96	0.31	0.13	0.05
09/27/06 10:42:20	7.28	0.26	0.12	0.04
09/27/06 11:42:20	4.49	0.30	0.08	0.00
09/27/06 12:42:20	0.17	0.04	0.00	0.00
09/27/06 13:42:20	0.03	0.00	0.00	0.00
09/27/06 14:42:20	0.40	0.24	0.01	0.00
09/27/06 15:42:20	0.06	0.00	0.00	0.00
09/27/06 16:42:20	1.86	0.93	0.03	0.00
09/27/06 17:42:20	4.51	1.21	0.08	0.00
09/27/06 18:42:20	3.96	1.66	0.07	0.00
09/27/06 19:42:20	1.12	0.14	0.02	0.00
09/27/06 20:42:20	1.52	0.17	0.03	0.00

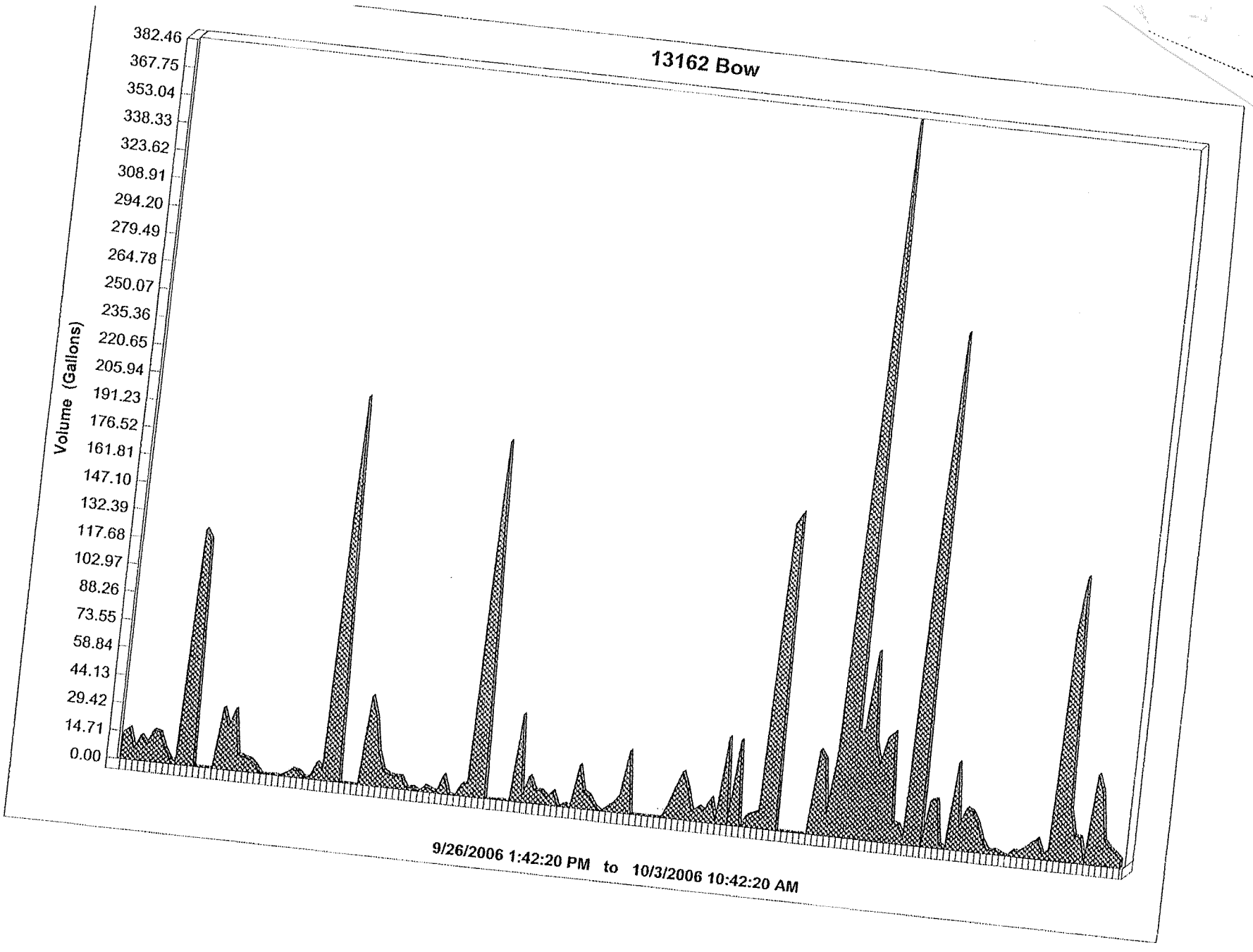
Date/Time	Volume	Maximum	Average	Minimum
09/27/06 21:42:20	9.37	1.18	0.16	0.02
09/27/06 22:42:20	6.52	0.28	0.11	0.01
09/27/06 23:42:20	205.01	10.27	3.42	0.02
09/28/06 00:42:20	107.66	10.17	1.79	0.00
09/28/06 01:42:20	0.01	0.00	0.00	0.00
09/28/06 02:42:20	0.01	0.00	0.00	0.00
09/28/06 03:42:20	0.01	0.00	0.00	0.00
09/28/06 04:42:20	0.01	0.00	0.00	0.00
09/28/06 05:42:20	47.32	3.59	0.79	0.00
09/28/06 06:42:20	37.29	2.28	0.62	0.01
09/28/06 07:42:20	18.95	1.41	0.32	0.06
09/28/06 08:42:20	9.22	1.57	0.15	0.03
09/28/06 09:42:20	7.45	0.33	0.12	0.04
09/28/06 10:42:20	6.94	0.23	0.12	0.03
09/28/06 11:42:20	6.97	0.26	0.12	0.03
09/28/06 12:42:20	1.61	0.23	0.03	0.00
09/28/06 13:42:20	2.18	1.52	0.04	0.00
09/28/06 14:42:20	0.18	0.03	0.00	0.00
09/28/06 15:42:20	3.36	1.59	0.06	0.00
09/28/06 16:42:20	1.95	1.67	0.03	0.00
09/28/06 17:42:20	0.97	0.13	0.02	0.00
09/28/06 18:42:20	10.24	1.26	0.17	0.00
09/28/06 19:42:20	0.47	0.13	0.01	0.00
09/28/06 20:42:20	0.03	0.00	0.00	0.00
09/28/06 21:42:20	6.70	1.52	0.11	0.00
09/28/06 22:42:20	7.34	1.18	0.12	0.01
09/28/06 23:42:20	189.86	7.94	3.16	0.01
09/29/06 00:42:20	108.17	8.04	1.80	0.00
09/29/06 01:42:20	0.01	0.00	0.00	0.00
09/29/06 02:42:20	0.01	0.00	0.00	0.00
09/29/06 03:42:20	0.23	0.03	0.00	0.00
09/29/06 04:42:20	0.26	0.07	0.00	0.00
09/29/06 05:42:20	0.06	0.00	0.00	0.00
09/29/06 06:42:20	46.69	3.59	0.78	0.00
09/29/06 07:42:20	3.57	0.30	0.06	0.00
09/29/06 08:42:20	14.52	1.56	0.24	0.08
09/29/06 09:42:20	7.53	0.37	0.13	0.04
09/29/06 10:42:20	7.63	0.30	0.13	0.06
09/29/06 11:42:20	4.82	0.26	0.08	0.00
09/29/06 12:42:20	8.12	1.32	0.14	0.00
09/29/06 13:42:20	0.27	0.22	0.00	0.00
09/29/06 14:42:20	1.95	1.33	0.03	0.00
09/29/06 15:42:20	0.40	0.04	0.01	0.00
09/29/06 16:42:20	23.22	1.26	0.39	0.00
09/29/06 17:42:20	9.73	2.69	0.16	0.00
09/29/06 18:42:20	7.69	0.27	0.13	0.03
09/29/06 19:42:20	2.36	1.24	0.04	0.00
09/29/06 20:42:20	0.03	0.00	0.00	0.00
09/29/06 21:42:20	2.91	1.54	0.05	0.00
09/29/06 22:42:20	5.39	1.45	0.09	0.00
09/29/06 23:42:20	9.82	6.59	0.16	0.00
09/30/06 00:42:20	33.46	5.63	0.56	0.00
09/30/06 01:42:20	0.01	0.00	0.00	0.00
09/30/06 02:42:20	0.01	0.00	0.00	0.00
09/30/06 03:42:20	0.01	0.00	0.00	0.00
09/30/06 04:42:20	0.07	0.04	0.00	0.00
09/30/06 05:42:20	0.07	0.00	0.00	0.00
09/30/06 06:42:20	0.03	0.00	0.00	0.00
09/30/06 07:42:20	7.33	1.54	0.12	0.00
09/30/06 08:42:20	16.98	1.65	0.28	0.06

Date/Time	Volume	Maximum	Average	Minimum
09/30/06 09:42:20	25.62	3.79	0.43	0.00
09/30/06 10:42:20	17.37	2.37	0.29	0.00
09/30/06 11:42:20	5.36	1.25	0.09	0.00
09/30/06 12:42:20	8.32	1.56	0.14	0.02
09/30/06 13:42:20	6.57	0.26	0.11	0.03
09/30/06 14:42:20	13.62	3.40	0.23	0.00
09/30/06 15:42:20	1.69	1.41	0.03	0.00
09/30/06 16:42:20	46.66	4.67	0.78	0.00
09/30/06 17:42:20	1.75	1.58	0.03	0.00
09/30/06 18:42:20	45.72	3.70	0.76	0.00
09/30/06 19:42:20	0.03	0.00	0.00	0.00
09/30/06 20:42:20	6.55	1.23	0.11	0.00
09/30/06 21:42:20	8.05	1.24	0.13	0.01
09/30/06 22:42:20	9.40	1.45	0.16	0.00
09/30/06 23:42:20	162.72	10.38	2.71	0.00
10/01/06 00:42:20	169.10	10.36	2.82	0.00
10/01/06 01:42:20	0.02	0.00	0.00	0.00
10/01/06 02:42:20	0.01	0.00	0.00	0.00
10/01/06 03:42:20	0.01	0.00	0.00	0.00
10/01/06 04:42:20	0.01	0.00	0.00	0.00
10/01/06 05:42:20	0.01	0.00	0.00	0.00
10/01/06 06:42:20	0.03	0.00	0.00	0.00
10/01/06 07:42:20	45.05	3.67	0.75	0.00
10/01/06 08:42:20	40.75	2.75	0.68	0.02
10/01/06 09:42:20	11.96	1.42	0.20	0.03
10/01/06 10:42:20	46.07	3.14	0.77	0.01
10/01/06 11:42:20	218.94	8.23	3.65	0.00
10/01/06 12:42:20	382.46	8.19	6.37	0.97
10/01/06 13:42:20	58.11	1.07	0.97	0.96
10/01/06 14:42:20	57.29	0.97	0.95	0.94
10/01/06 15:42:20	100.32	3.83	1.67	0.86
10/01/06 16:42:20	52.80	2.09	0.88	0.84
10/01/06 17:42:20	40.95	2.24	0.68	0.02
10/01/06 18:42:20	56.19	4.07	0.94	0.05
10/01/06 19:42:20	59.25	4.06	0.99	0.06
10/01/06 20:42:20	11.33	1.69	0.19	0.04
10/01/06 21:42:20	10.40	1.65	0.17	0.03
10/01/06 22:42:20	3.99	0.71	0.07	0.00
10/01/06 23:42:20	179.36	7.92	2.99	0.00
10/02/06 00:42:20	273.64	7.89	4.56	0.00
10/02/06 01:42:20	0.03	0.00	0.00	0.00
10/02/06 02:42:20	25.11	2.21	0.42	0.00
10/02/06 03:42:20	25.95	2.18	0.43	0.00
10/02/06 04:42:20	2.72	0.20	0.05	0.00
10/02/06 05:42:20	0.12	0.00	0.00	0.00
10/02/06 06:42:20	46.96	3.67	0.78	0.00
10/02/06 07:42:20	12.99	2.93	0.22	0.00
10/02/06 08:42:20	22.95	3.03	0.38	0.03
10/02/06 09:42:20	21.59	1.41	0.36	0.06
10/02/06 10:42:20	16.00	1.43	0.27	0.04
10/02/06 11:42:20	7.06	0.29	0.12	0.01
10/02/06 12:42:20	2.20	1.44	0.04	0.00
10/02/06 13:42:20	2.82	1.23	0.05	0.00
10/02/06 14:42:20	1.39	0.98	0.02	0.00
10/02/06 15:42:20	0.10	0.00	0.00	0.00
10/02/06 16:42:20	3.40	1.46	0.06	0.00
10/02/06 17:42:20	3.36	1.91	0.06	0.00
10/02/06 18:42:20	5.60	0.28	0.09	0.00
10/02/06 19:42:20	8.64	1.42	0.14	0.03
10/02/06 20:42:20	11.16	0.73	0.19	0.03

Date/Time	Volume	Maximum	Average	Minimum
10/02/06 21:42:20	3.15	0.45	0.05	0.00
10/02/06 22:42:20	6.55	2.16	0.11	0.00
10/02/06 23:42:20	121.91	10.64	2.03	0.00
10/03/06 00:42:20	152.05	7.11	2.53	0.00
10/03/06 01:42:20	28.74	2.93	0.48	0.00
10/03/06 02:42:20	14.80	2.89	0.25	0.00
10/03/06 03:42:20	14.44	2.94	0.24	0.00
10/03/06 04:42:20	1.13	0.14	0.02	0.00
10/03/06 05:42:20	48.53	3.45	0.81	0.00
10/03/06 06:42:20	39.51	1.57	0.66	0.00
10/03/06 07:42:20	13.89	1.61	0.23	0.04
10/03/06 08:42:20	10.31	1.78	0.17	0.04
10/03/06 09:42:20	7.97	0.30	0.13	0.06
10/03/06 10:42:20	4.74	0.20	0.08	0.00

Data Summary

Cumulative Volume	4,360.05
Maximum Volume	382.46
Maximum Flow Rate	10.64
Average Flow Rate	0.44
Minimum Flow Rate	0.00


13162 Bow
Volume (Gallons)
382.46
367.75
353.04
338.33
323.62
308.91
294.20
279.49
264.78
250.07
235.36
220.65
205.94
191.23
176.52
161.81
147.10
132.39
117.68
102.97
88.26
73.55
58.84
44.13
29.42
14.71
0.00
9/26/2006 1:42:20 PM to 10/3/2006 10:42:20 AM

Data File Name C:\PROGRAMF\MMV30\TUSTINCF.MDB

Flow Report

Location Information

ID	4
Name	City of Tustin
Address	1541 Copperfield
City	Tustin
State/Prov	CA
Postal Code	
Phone	
Notes	

Meter Information

Make	Badger
Model	Recordall PD
Size	Model 25
Unit	Gallons

Grid Interval	3,600	Seconds
Max-Min Interval	60	Seconds

Date/Time	Volume	Maximum	Average	Minimum
09/18/06 15:11:33	8.75	3.01	0.15	0.00
09/18/06 16:11:33	12.67	2.54	0.21	0.00
09/18/06 17:11:33	2.22	1.91	0.04	0.00
09/18/06 18:11:33	7.57	1.58	0.13	0.00
09/18/06 19:11:33	100.63	6.28	1.68	0.00
09/18/06 20:11:33	198.32	6.23	3.31	0.00
09/18/06 21:11:33	56.00	5.32	0.93	0.00
09/18/06 22:11:33	3.42	3.08	0.06	0.00
09/18/06 23:11:33	3.95	1.79	0.07	0.00
09/19/06 00:11:33	10.66	1.58	0.18	0.00
09/19/06 01:11:33	3.78	1.64	0.06	0.00
09/19/06 02:11:33	2.80	1.72	0.05	0.00
09/19/06 03:11:33	0.05	0.01	0.00	0.00
09/19/06 04:11:33	0.01	0.00	0.00	0.00
09/19/06 05:11:33	17.83	3.19	0.30	0.00
09/19/06 06:11:33	24.26	7.96	0.40	0.00
09/19/06 07:11:33	43.63	8.15	0.73	0.00
09/19/06 08:11:33	45.06	2.91	0.75	0.00
09/19/06 09:11:33	58.78	10.18	0.98	0.00
09/19/06 10:11:33	17.69	3.60	0.29	0.00
09/19/06 11:11:33	37.36	2.47	0.62	0.00
09/19/06 12:11:33	22.46	1.65	0.37	0.00
09/19/06 13:11:33	5.30	1.40	0.09	0.00
09/19/06 14:11:33	2.37	1.65	0.04	0.00
09/19/06 15:11:33	24.32	4.15	0.41	0.00
09/19/06 16:11:33	2.85	0.74	0.05	0.00
09/19/06 17:11:33	0.71	0.20	0.01	0.00
09/19/06 18:11:33	53.61	5.43	0.89	0.00
09/19/06 19:11:33	211.83	6.89	3.53	0.00
09/19/06 20:11:33	337.02	15.00	5.62	0.00
09/19/06 21:11:33	92.89	8.15	1.55	0.00
09/19/06 22:11:33	33.69	6.11	0.56	0.00

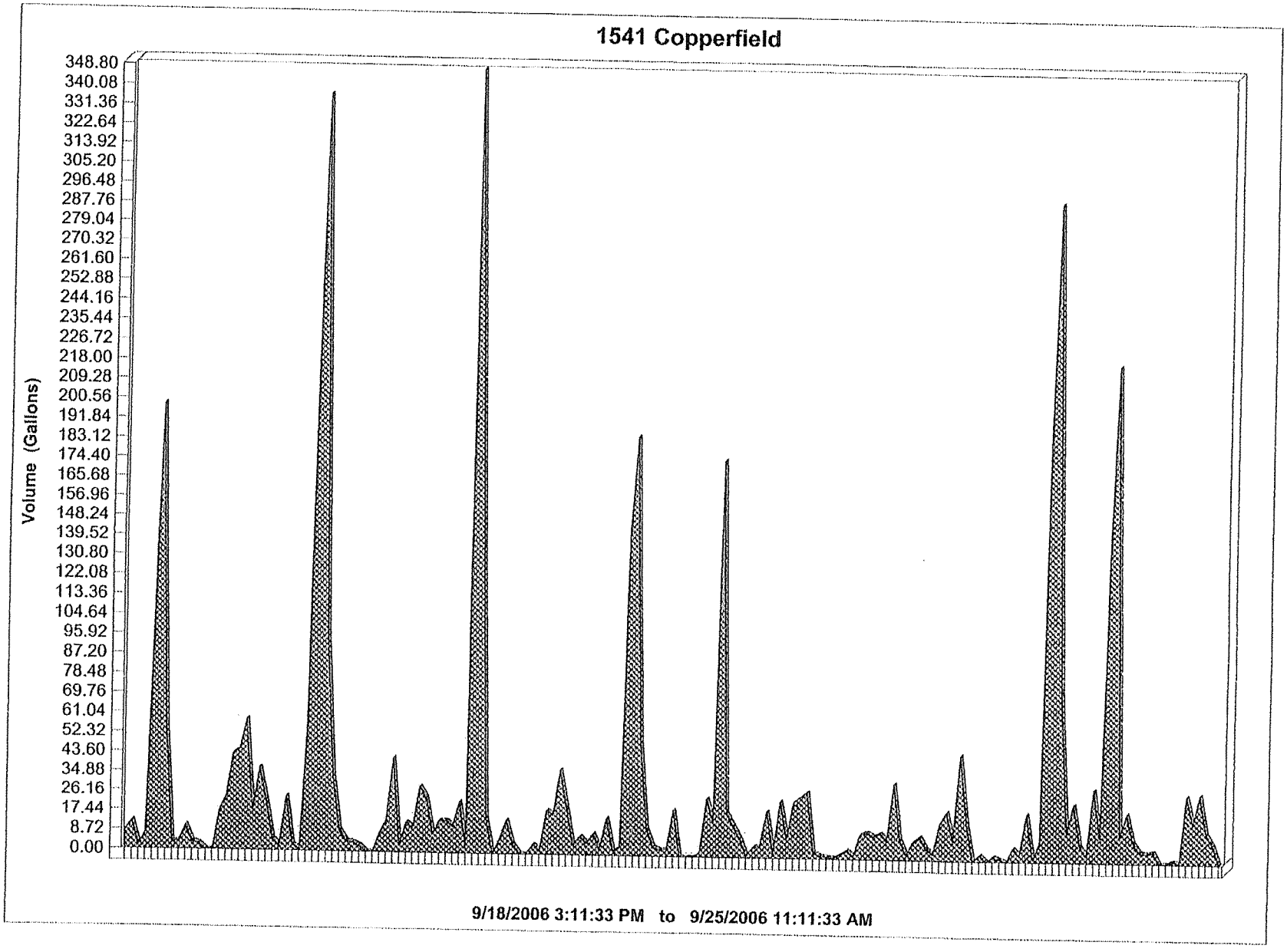
Date/Time	Volume	Maximum	Average	Minimum
09/19/06 23:11:33	9.54	2.49	0.16	0.00
09/20/06 00:11:33	4.93	3.14	0.08	0.00
09/20/06 01:11:33	4.28	1.97	0.07	0.00
09/20/06 02:11:33	2.89	2.16	0.05	0.00
09/20/06 03:11:33	0.17	0.03	0.00	0.00
09/20/06 04:11:33	0.13	0.01	0.00	0.00
09/20/06 05:11:33	8.52	3.14	0.14	0.00
09/20/06 06:11:33	14.16	4.44	0.24	0.00
09/20/06 07:11:33	42.26	2.95	0.70	0.00
09/20/06 08:11:33	3.14	1.16	0.05	0.00
09/20/06 09:11:33	13.34	2.91	0.22	0.00
09/20/06 10:11:33	10.98	4.04	0.18	0.00
09/20/06 11:11:33	29.54	6.69	0.49	0.00
09/20/06 12:11:33	24.64	8.61	0.41	0.00
09/20/06 13:11:33	8.47	2.33	0.14	0.00
09/20/06 14:11:33	14.41	4.93	0.24	0.00
09/20/06 15:11:33	14.26	3.37	0.24	0.00
09/20/06 16:11:33	11.74	4.14	0.20	0.00
09/20/06 17:11:33	22.91	8.37	0.38	0.00
09/20/06 18:11:33	3.15	1.13	0.05	0.00
09/20/06 19:11:33	349.08	11.02	5.82	0.00
09/20/06 20:11:33	169.95	8.87	2.83	0.02
09/20/06 21:11:33	15.72	3.47	0.26	0.00
09/20/06 22:11:33	0.16	0.05	0.00	0.00
09/20/06 23:11:33	6.54	3.37	0.11	0.00
09/21/06 00:11:33	15.01	2.68	0.25	0.00
09/21/06 01:11:33	4.42	1.82	0.07	0.00
09/21/06 02:11:33	0.13	0.02	0.00	0.00
09/21/06 03:11:33	0.02	0.00	0.00	0.00
09/21/06 04:11:33	4.55	1.99	0.08	0.00
09/21/06 05:11:33	1.42	0.40	0.02	0.00
09/21/06 06:11:33	19.56	3.33	0.33	0.00
09/21/06 07:11:33	17.87	2.14	0.30	0.00
09/21/06 08:11:33	38.03	3.73	0.63	0.00
09/21/06 09:11:33	21.15	4.28	0.35	0.00
09/21/06 10:11:33	4.42	1.72	0.07	0.00
09/21/06 11:11:33	8.42	1.96	0.14	0.00
09/21/06 12:11:33	5.41	1.58	0.09	0.00
09/21/06 13:11:33	9.72	2.95	0.16	0.00
09/21/06 14:11:33	2.93	0.95	0.05	0.00
09/21/06 15:11:33	16.68	5.70	0.28	0.00
09/21/06 16:11:33	2.26	0.85	0.04	0.00
09/21/06 17:11:33	3.85	1.74	0.06	0.00
09/21/06 18:11:33	143.67	7.09	2.39	0.00
09/21/06 19:11:33	186.90	9.20	3.12	0.00
09/21/06 20:11:33	50.81	5.49	0.85	0.00
09/21/06 21:11:33	12.17	3.15	0.20	0.00
09/21/06 22:11:33	4.33	2.05	0.07	0.00
09/21/06 23:11:33	2.94	1.73	0.05	0.00
09/22/06 00:11:33	3.46	2.64	0.06	0.00
09/22/06 01:11:33	20.62	2.71	0.34	0.00
09/22/06 02:11:33	0.01	0.00	0.00	0.00
09/22/06 03:11:33	0.04	0.01	0.00	0.00
09/22/06 04:11:33	0.00	0.00	0.00	0.00
09/22/06 05:11:33	1.86	1.22	0.03	0.00
09/22/06 06:11:33	26.05	4.71	0.43	0.00
09/22/06 07:11:33	15.34	2.75	0.26	0.00
09/22/06 08:11:33	176.61	10.74	2.94	0.00
09/22/06 09:11:33	19.64	3.85	0.33	0.01
09/22/06 10:11:33	14.00	4.27	0.23	0.02

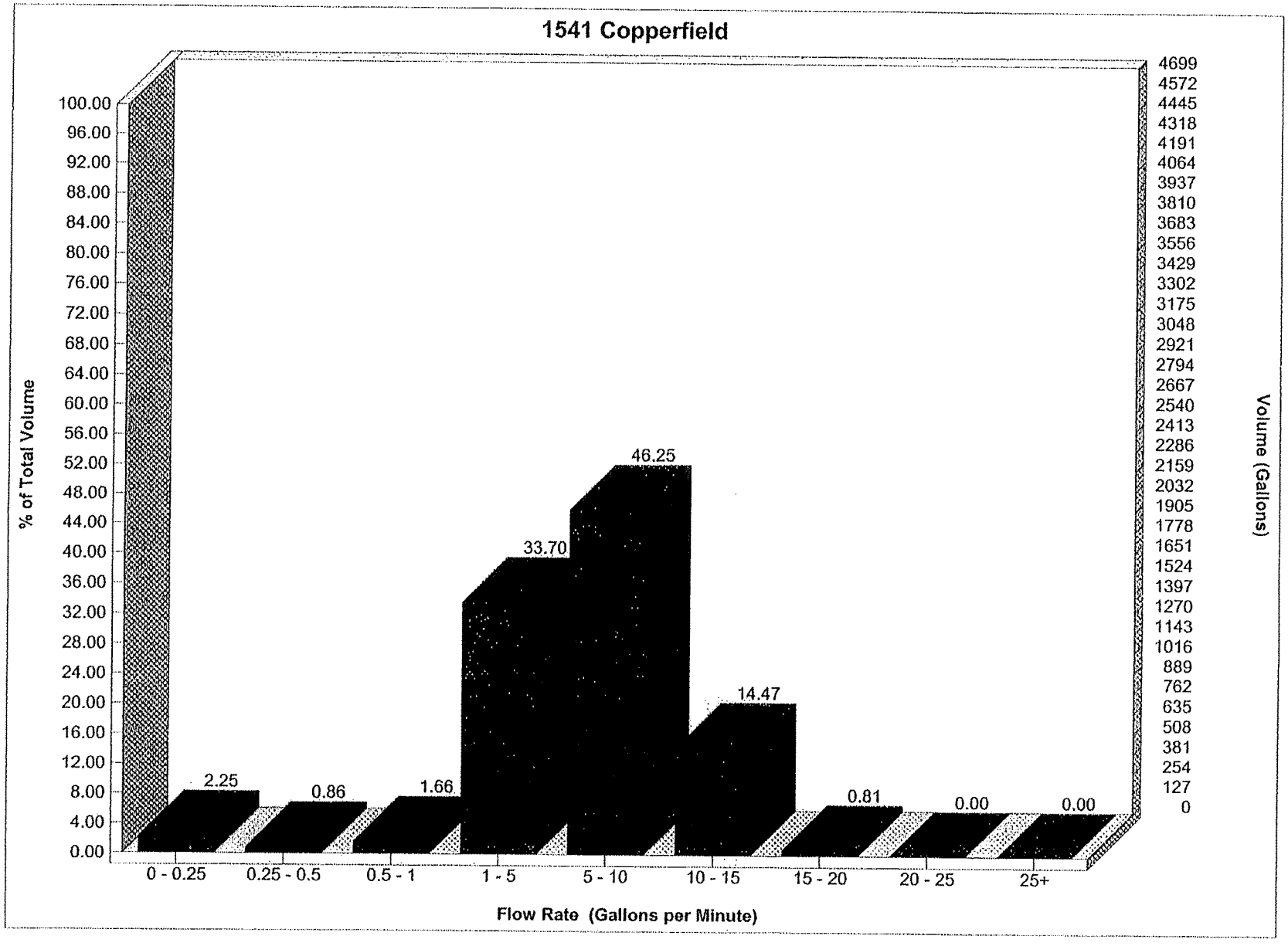
Date/Time	Volume	Maximum	Average	Minimum
09/22/06 11:11:33	8.70	1.67	0.14	0.00
09/22/06 12:11:33	1.15	0.06	0.02	0.00
09/22/06 13:11:33	5.09	1.97	0.09	0.00
09/22/06 14:11:33	5.43	1.19	0.09	0.00
09/22/06 15:11:33	20.75	4.42	0.35	0.00
09/22/06 16:11:33	2.10	1.15	0.04	0.00
09/22/06 17:11:33	25.40	2.53	0.42	0.00
09/22/06 18:11:33	8.63	1.65	0.14	0.00
09/22/06 19:11:33	25.17	2.71	0.42	0.00
09/22/06 20:11:33	27.42	3.28	0.46	0.00
09/22/06 21:11:33	29.67	4.26	0.50	0.00
09/22/06 22:11:33	2.72	1.82	0.05	0.00
09/22/06 23:11:33	1.53	0.08	0.03	0.00
09/23/06 00:11:33	1.07	0.07	0.02	0.00
09/23/06 01:11:33	0.68	0.07	0.01	0.00
09/23/06 02:11:33	2.32	2.06	0.04	0.00
09/23/06 03:11:33	3.92	3.06	0.06	0.00
09/23/06 04:11:33	1.71	0.08	0.03	0.00
09/23/06 05:11:33	11.22	2.95	0.19	0.01
09/23/06 06:11:33	11.89	3.39	0.20	0.00
09/23/06 07:11:33	10.53	1.91	0.17	0.01
09/23/06 08:11:33	11.71	3.08	0.19	0.00
09/23/06 09:11:33	8.46	1.42	0.14	0.00
09/23/06 10:11:33	34.09	3.65	0.57	0.00
09/23/06 11:11:33	9.10	2.75	0.15	0.00
09/23/06 12:11:33	2.52	1.89	0.04	0.00
09/23/06 13:11:33	8.41	2.41	0.14	0.00
09/23/06 14:11:33	10.51	1.89	0.17	0.00
09/23/06 15:11:33	5.31	1.77	0.09	0.00
09/23/06 16:11:33	3.02	2.09	0.05	0.00
09/23/06 17:11:33	16.62	1.72	0.28	0.00
09/23/06 18:11:33	21.65	7.86	0.36	0.00
09/23/06 19:11:33	8.92	2.52	0.15	0.00
09/23/06 20:11:33	47.24	2.59	0.79	0.00
09/23/06 21:11:33	17.31	2.15	0.29	0.00
09/23/06 22:11:33	0.15	0.02	0.00	0.00
09/23/06 23:11:33	3.06	1.47	0.05	0.00
09/24/06 00:11:33	0.07	0.02	0.00	0.00
09/24/06 01:11:33	2.36	1.71	0.04	0.00
09/24/06 02:11:33	1.21	0.67	0.02	0.00
09/24/06 03:11:33	0.08	0.01	0.00	0.00
09/24/06 04:11:33	6.22	2.37	0.10	0.00
09/24/06 05:11:33	3.08	1.21	0.05	0.00
09/24/06 06:11:33	21.25	3.22	0.35	0.00
09/24/06 07:11:33	1.35	0.08	0.02	0.00
09/24/06 08:11:33	8.91	3.65	0.15	0.00
09/24/06 09:11:33	190.46	6.88	3.17	0.00
09/24/06 10:11:33	293.06	13.20	4.88	0.00
09/24/06 11:11:33	75.98	13.35	1.27	0.00
09/24/06 12:11:33	13.20	5.28	0.22	0.00
09/24/06 13:11:33	25.80	3.02	0.43	0.00
09/24/06 14:11:33	7.42	2.31	0.12	0.00
09/24/06 15:11:33	3.00	1.79	0.05	0.00
09/24/06 16:11:33	32.76	2.63	0.55	0.00
09/24/06 17:11:33	11.21	1.86	0.19	0.00
09/24/06 18:11:33	135.75	5.65	2.26	0.00
09/24/06 19:11:33	221.25	5.61	3.69	0.00
09/24/06 20:11:33	11.44	2.58	0.19	0.00
09/24/06 21:11:33	21.99	3.85	0.37	0.00
09/24/06 22:11:33	9.44	1.64	0.16	0.00

Date/Time	Volume	Maximum	Average	Minimum
09/24/06 23:11:33	5.33	1.62	0.09	0.00
09/25/06 00:11:33	4.64	2.24	0.08	0.00
09/25/06 01:11:33	5.54	2.67	0.09	0.00
09/25/06 02:11:33	0.00	0.00	0.00	0.00
09/25/06 03:11:33	0.37	0.36	0.01	0.00
09/25/06 04:11:33	1.47	1.45	0.02	0.00
09/25/06 05:11:33	0.00	0.00	0.00	0.00
09/25/06 06:11:33	30.44	5.58	0.51	0.00
09/25/06 07:11:33	17.61	3.03	0.29	0.00
09/25/06 08:11:33	30.95	3.15	0.52	0.00
09/25/06 09:11:33	13.56	4.29	0.23	0.00
09/25/06 10:11:33	8.73	2.08	0.14	0.00
09/25/06 11:11:33	0.31	0.10	0.00	0.00

Data Summary

Cumulative Volume	4,713.12
Maximum Volume	349.08
Maximum Flow Rate	15.00
Average Flow Rate	0.48
Minimum Flow Rate	0.00


1541 Copperfield
Volume (Gallons)
348.80
340.08
331.36
322.64
313.92
305.20
296.48
287.76
279.04
270.32
261.60
252.88
244.16
235.44
226.72
218.00
209.28
200.56
191.84
183.12
174.40
165.68
156.96
148.24
139.52
130.80
122.08
113.36
104.64
95.92
87.20
78.48
69.76
61.04
52.32
43.60
34.88
26.16
17.44
8.72
0.00
9/18/2006 3:11:33 PM to 9/25/2006 11:11:33 AM


1541 Copperfield
% of Total Volume
100.00
96.00
92.00
88.00
84.00
80.00
76.00
72.00
68.00
64.00
60.00
56.00
52.00
48.00
44.00
40.00
36.00
32.00
28.00
24.00
20.00
16.00
12.00
8.00
4.00
0.00
Volume (Gallons)
4699
4572
4445
4318
4191
4064
3937
3810
3683
3556
3429
3302
3175
3048
2921
2794
2667
2540
2413
2286
2159
2032
1905
1778
1651
1524
1397
1270
1143
1016
889
762
635
508
381
254
127
0
2.25
0.86
1.66
33.70
46.25
14.47
0.81
0.00
0.00
0 - 0.25
0.25 - 0.5
0.5 - 1
1 - 5
5 - 10
10 - 15
15 - 20
20 - 25
25+
Flow Rate (Gallons per Minute)

Data File Nam(C:\PROGRAMF\MMV30\TUSTINP.MDB

Flow Report

Location Information

ID 5
Name City of Tustin
Address 17382 Parker Dr.
City Tustin
State/Prov CA
Postal Code
Phone
Notes

Meter Information

Make Badger
Model Recordall PD
Size Model 25
Unit Gallons

Grid Interval 3,600 Seconds
Max-Min Interval 60 Seconds

Date/Time	Volume	Maximum	Average	Minimum
09/18/06 14:55:35	6.63	3.65	0.11	0.00
09/18/06 15:55:35	2.42	0.17	0.04	0.02
09/18/06 16:55:35	5.86	2.97	0.10	0.02
09/18/06 17:55:35	17.27	2.88	0.29	0.02
09/18/06 18:55:35	16.02	2.86	0.27	0.02
09/18/06 19:55:35	4.24	0.57	0.07	0.02
09/18/06 20:55:35	1.78	0.05	0.03	0.02
09/18/06 21:55:35	5.17	3.50	0.09	0.02
09/18/06 22:55:35	5.79	3.21	0.10	0.02
09/18/06 23:55:35	1.58	0.05	0.03	0.02
09/19/06 00:55:35	1.54	0.05	0.03	0.02
09/19/06 01:55:35	1.43	0.04	0.02	0.02
09/19/06 02:55:35	1.37	0.05	0.02	0.02
09/19/06 03:55:35	461.88	13.39	7.70	0.02
09/19/06 04:55:35	1.59	0.04	0.03	0.02
09/19/06 05:55:35	5.05	2.30	0.08	0.02
09/19/06 06:55:35	4.35	0.67	0.07	0.02
09/19/06 07:55:35	11.22	3.51	0.19	0.01
09/19/06 08:55:35	1.74	0.05	0.03	0.02
09/19/06 09:55:35	1.87	0.07	0.03	0.02
09/19/06 10:55:35	2.01	0.12	0.03	0.02
09/19/06 11:55:35	2.43	0.30	0.04	0.02
09/19/06 12:55:35	2.45	0.39	0.04	0.02
09/19/06 13:55:35	3.56	0.52	0.06	0.02
09/19/06 14:55:35	6.79	3.69	0.11	0.02
09/19/06 15:55:35	13.62	4.24	0.23	0.02
09/19/06 16:55:35	2.10	0.10	0.04	0.02
09/19/06 17:55:35	17.71	2.92	0.29	0.02
09/19/06 18:55:35	2.82	0.41	0.05	0.02
09/19/06 19:55:35	2.74	0.49	0.05	0.02
09/19/06 20:55:35	1.79	0.08	0.03	0.02
09/19/06 21:55:35	1.63	0.05	0.03	0.02

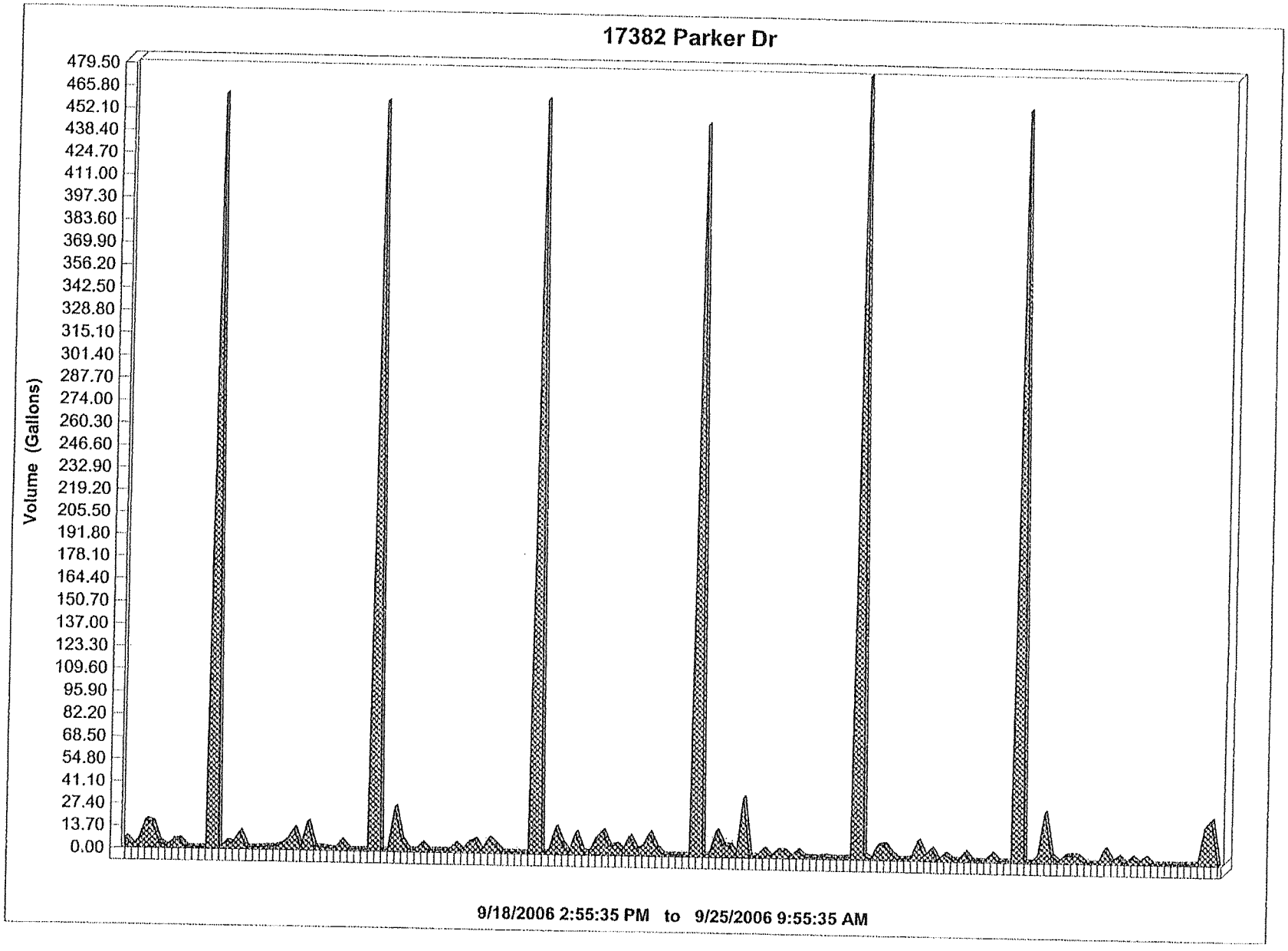
Date/Time	Volume	Maximum	Average	Minimum
09/19/06 22:55:35	6.49	3.21	0.11	0.02
09/19/06 23:55:35	1.60	0.04	0.03	0.02
09/20/06 00:55:35	1.54	0.04	0.03	0.01
09/20/06 01:55:35	1.47	0.06	0.02	0.01
09/20/06 02:55:35	1.59	0.05	0.03	0.01
09/20/06 03:55:35	458.83	13.24	7.65	0.01
09/20/06 04:55:35	1.60	0.05	0.03	0.02
09/20/06 05:55:35	1.58	0.05	0.03	0.02
09/20/06 06:55:35	27.63	2.57	0.46	0.01
09/20/06 07:55:35	7.98	3.61	0.13	0.02
09/20/06 08:55:35	1.89	0.08	0.03	0.02
09/20/06 09:55:35	1.83	0.06	0.03	0.02
09/20/06 10:55:35	5.66	3.59	0.09	0.02
09/20/06 11:55:35	1.97	0.07	0.03	0.02
09/20/06 12:55:35	1.94	0.07	0.03	0.02
09/20/06 13:55:35	2.15	0.08	0.04	0.02
09/20/06 14:55:35	1.93	0.07	0.03	0.02
09/20/06 15:55:35	5.67	3.68	0.09	0.02
09/20/06 16:55:35	2.06	0.07	0.03	0.02
09/20/06 17:55:35	6.67	2.54	0.11	0.02
09/20/06 18:55:35	8.53	4.83	0.14	0.02
09/20/06 19:55:35	1.81	0.07	0.03	0.02
09/20/06 20:55:35	9.57	3.50	0.16	0.02
09/20/06 21:55:35	5.74	3.51	0.10	0.02
09/20/06 22:55:35	1.59	0.04	0.03	0.02
09/20/06 23:55:35	1.57	0.06	0.03	0.02
09/21/06 00:55:35	1.58	0.07	0.03	0.01
09/21/06 01:55:35	1.54	0.05	0.03	0.02
09/21/06 02:55:35	1.46	0.06	0.02	0.01
09/21/06 03:55:35	461.54	13.36	7.69	0.02
09/21/06 04:55:35	1.66	0.05	0.03	0.02
09/21/06 05:55:35	2.78	0.90	0.05	0.02
09/21/06 06:55:35	16.89	3.50	0.28	0.02
09/21/06 07:55:35	6.96	3.30	0.12	0.01
09/21/06 08:55:35	1.92	0.08	0.03	0.02
09/21/06 09:55:35	13.86	2.47	0.23	0.03
09/21/06 10:55:35	2.76	0.07	0.05	0.03
09/21/06 11:55:35	2.31	0.08	0.04	0.03
09/21/06 12:55:35	10.69	2.44	0.18	0.03
09/21/06 13:55:35	15.44	3.73	0.26	0.03
09/21/06 14:55:35	5.70	3.18	0.09	0.03
09/21/06 15:55:35	7.09	2.36	0.12	0.03
09/21/06 16:55:35	3.70	0.82	0.06	0.02
09/21/06 17:55:35	12.10	2.06	0.20	0.02
09/21/06 18:55:35	4.37	0.63	0.07	0.02
09/21/06 19:55:35	6.44	1.17	0.11	0.02
09/21/06 20:55:35	14.28	3.62	0.24	0.02
09/21/06 21:55:35	5.68	3.66	0.09	0.02
09/21/06 22:55:35	1.58	0.06	0.03	0.01
09/21/06 23:55:35	1.67	0.06	0.03	0.01
09/22/06 00:55:35	1.50	0.06	0.03	0.01
09/22/06 01:55:35	1.58	0.06	0.03	0.01
09/22/06 02:55:35	1.46	0.07	0.02	0.01
09/22/06 03:55:35	447.89	13.02	7.47	0.01
09/22/06 04:55:35	1.75	0.13	0.03	0.01
09/22/06 05:55:35	2.44	0.86	0.04	0.01
09/22/06 06:55:35	16.35	4.22	0.27	0.01
09/22/06 07:55:35	7.85	2.82	0.13	0.01
09/22/06 08:55:35	7.85	4.38	0.13	0.02
09/22/06 09:55:35	1.57	0.05	0.03	0.02

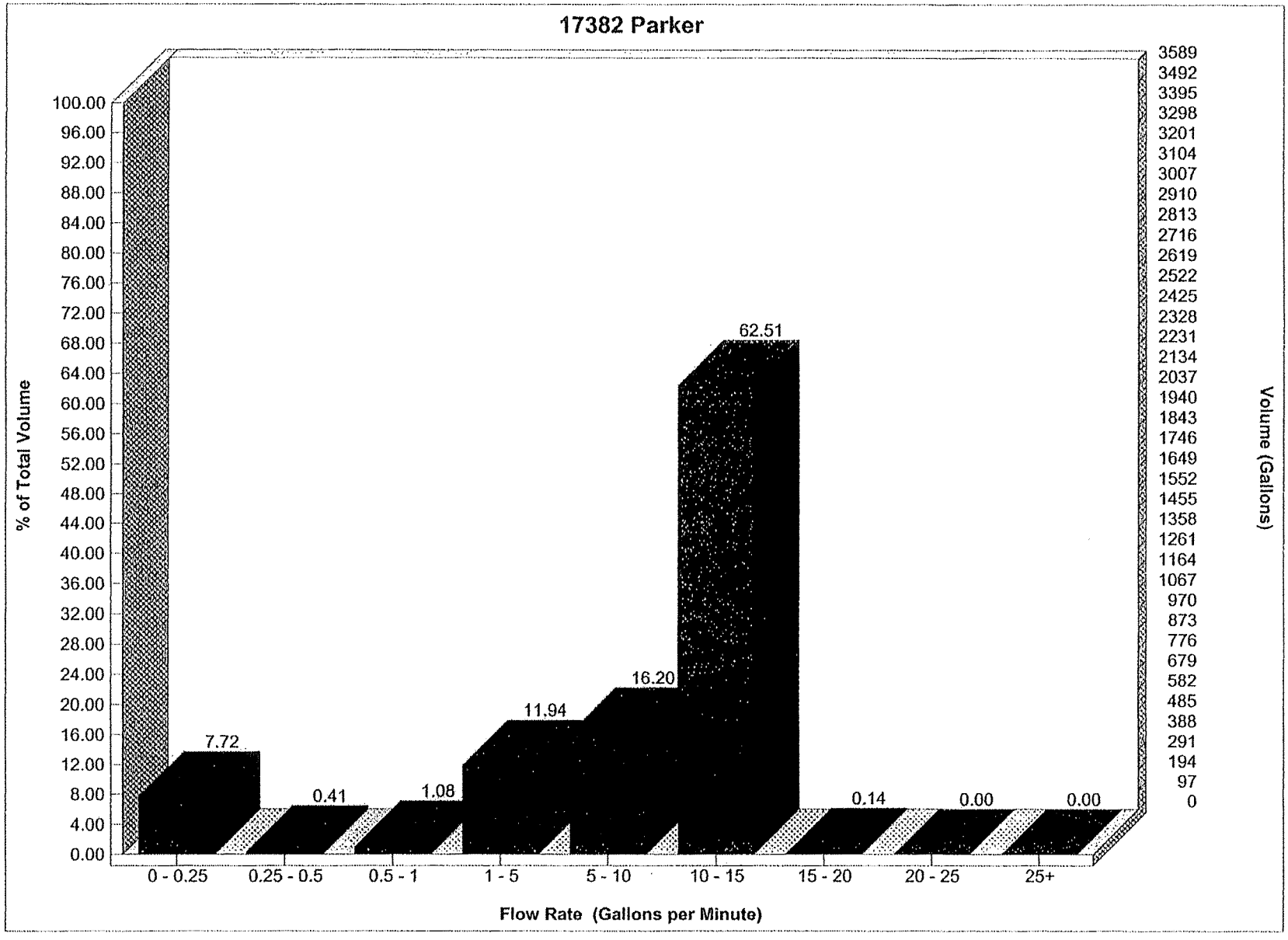
Date/Time	Volume	Maximum	Average	Minimum
09/22/06 10:55:35	37.03	6.26	0.62	0.02
09/22/06 11:55:35	1.83	0.07	0.03	0.02
09/22/06 12:55:35	1.69	0.04	0.03	0.02
09/22/06 13:55:35	5.81	3.63	0.10	0.02
09/22/06 14:55:35	1.60	0.03	0.03	0.02
09/22/06 15:55:35	5.16	3.54	0.09	0.02
09/22/06 16:55:35	4.94	3.41	0.08	0.02
09/22/06 17:55:35	1.51	0.07	0.03	0.02
09/22/06 18:55:35	5.43	2.96	0.09	0.02
09/22/06 19:55:35	1.89	0.40	0.03	0.02
09/22/06 20:55:35	1.74	0.08	0.03	0.02
09/22/06 21:55:35	1.60	0.05	0.03	0.02
09/22/06 22:55:35	2.34	0.34	0.04	0.01
09/22/06 23:55:35	1.69	0.05	0.03	0.01
09/23/06 00:55:35	1.65	0.07	0.03	0.01
09/23/06 01:55:35	1.90	0.08	0.03	0.01
09/23/06 02:55:35	2.22	0.10	0.04	0.02
09/23/06 03:55:35	479.50	13.52	7.99	0.02
09/23/06 04:55:35	3.23	0.86	0.05	0.01
09/23/06 05:55:35	1.39	0.04	0.02	0.01
09/23/06 06:55:35	9.48	3.14	0.16	0.02
09/23/06 07:55:35	10.04	3.11	0.17	0.02
09/23/06 08:55:35	4.63	3.40	0.08	0.02
09/23/06 09:55:35	1.49	0.08	0.03	0.02
09/23/06 10:55:35	2.04	0.09	0.03	0.02
09/23/06 11:55:35	2.01	0.31	0.03	0.01
09/23/06 12:55:35	12.63	3.45	0.21	0.01
09/23/06 13:55:35	3.86	0.88	0.06	0.02
09/23/06 14:55:35	8.06	1.12	0.13	0.02
09/23/06 15:55:35	1.55	0.05	0.03	0.02
09/23/06 16:55:35	5.03	2.17	0.08	0.02
09/23/06 17:55:35	1.99	0.21	0.03	0.02
09/23/06 18:55:35	1.77	0.12	0.03	0.01
09/23/06 19:55:35	6.22	2.89	0.10	0.02
09/23/06 20:55:35	1.46	0.05	0.02	0.01
09/23/06 21:55:35	1.63	0.07	0.03	0.01
09/23/06 22:55:35	1.67	0.06	0.03	0.01
09/23/06 23:55:35	5.71	2.05	0.09	0.01
09/24/06 00:55:35	1.59	0.05	0.03	0.01
09/24/06 01:55:35	1.48	0.06	0.03	0.01
09/24/06 02:55:35	1.44	0.05	0.02	0.00
09/24/06 03:55:35	460.11	13.29	7.67	0.01
09/24/06 04:55:35	1.31	0.05	0.02	0.00
09/24/06 05:55:35	1.22	0.05	0.02	0.01
09/24/06 06:55:35	5.55	3.08	0.09	0.02
09/24/06 07:55:35	31.23	4.14	0.52	0.02
09/24/06 08:55:35	5.25	2.90	0.09	0.02
09/24/06 09:55:35	1.48	0.05	0.03	0.02
09/24/06 10:55:35	5.28	2.96	0.09	0.02
09/24/06 11:55:35	5.80	2.15	0.10	0.02
09/24/06 12:55:35	4.87	3.50	0.08	0.02
09/24/06 13:55:35	1.36	0.04	0.02	0.02
09/24/06 14:55:35	1.42	0.05	0.02	0.02
09/24/06 15:55:35	1.30	0.04	0.02	0.02
09/24/06 16:55:35	9.72	2.83	0.16	0.02
09/24/06 17:55:35	2.40	0.56	0.04	0.02
09/24/06 18:55:35	5.17	2.32	0.09	0.02
09/24/06 19:55:35	1.37	0.03	0.02	0.02
09/24/06 20:55:35	4.84	2.54	0.08	0.02
09/24/06 21:55:35	1.93	0.35	0.03	0.02

Date/Time	Volume	Maximum	Average	Minimum
09/24/06 22:55:35	5.00	2.15	0.08	0.02
09/24/06 23:55:35	1.52	0.05	0.03	0.02
09/25/06 00:55:35	1.46	0.05	0.02	0.01
09/25/06 01:55:35	1.59	0.04	0.03	0.01
09/25/06 02:55:35	1.58	0.06	0.03	0.01
09/25/06 03:55:35	1.48	0.05	0.03	0.01
09/25/06 04:55:35	1.73	0.06	0.03	0.01
09/25/06 05:55:35	1.55	0.07	0.03	0.01
09/25/06 06:55:35	2.42	0.83	0.04	0.01
09/25/06 07:55:35	23.98	6.20	0.40	0.01
09/25/06 08:55:35	28.57	4.94	0.48	0.02
09/25/06 09:55:35	1.58	0.13	0.03	0.02

Data Summary

Cumulative Volume	3,557.51
Maximum Volume	479.50
Maximum Flow Rate	13.52
Average Flow Rate	0.36
Minimum Flow Rate	0.00


17382 Parker Dr
Volume (Gallons)
479.50
465.80
452.10
438.40
424.70
411.00
397.30
383.60
369.90
356.20
342.50
328.80
315.10
301.40
287.70
274.00
260.30
246.60
232.90
219.20
205.50
191.80
178.10
164.40
150.70
137.00
123.30
109.60
95.90
82.20
68.50
54.80
41.10
27.40
13.70
0.00
9/18/2006 2:55:35 PM to 9/25/2006 9:55:35 AM


17382 Parker
% of Total Volume
100.00
96.00
92.00
88.00
84.00
80.00
76.00
72.00
68.00
64.00
60.00
56.00
52.00
48.00
44.00
40.00
36.00
32.00
28.00
24.00
20.00
16.00
12.00
8.00
4.00
0.00
7.72
0.41
1.08
11.94
16.20
62.51
0.14
0.00
0.00
0 - 0.25
0.25 - 0.5
0.5 - 1
1 - 5
5 - 10
10 - 15
15 - 20
20 - 25
25+
Flow Rate (Gallons per Minute)
Volume (Gallons)
3589
3492
3395
3298
3201
3104
3007
2910
2813
2716
2619
2522
2425
2328
2231
2134
2037
1940
1843
1746
1649
1552
1455
1358
1261
1164
1067
970
873
776
679
582
485
388
291
194
97
0

Data File Nam C:\PROGRAMF\MMV30\TUSTINOR.MDB

Flow Report

Location Information

ID 6
Name City of Tustin
Address 18331 Oak Ridge
City Tustin
State/Prov CA
Postal Code
Phone
Notes

Meter Information

Make Badger
Model Recordall PD
Size Model 25
Unit Gallons

Grid Interval 3,600 Seconds
Max-Min Interval 60 Seconds

Date/Time	Volume	Maximum	Average	Minimum
09/18/06 14:33:00	3.85	1.79	0.06	0.03
09/18/06 15:33:00	2.05	0.06	0.03	0.03
09/18/06 16:33:00	2.05	0.05	0.03	0.02
09/18/06 17:33:00	2.02	0.07	0.03	0.03
09/18/06 18:33:00	4.05	1.77	0.07	0.00
09/18/06 19:33:00	2.75	0.85	0.05	0.01
09/18/06 20:33:00	1.90	0.12	0.03	0.01
09/18/06 21:33:00	7.20	1.79	0.12	0.00
09/18/06 22:33:00	15.22	1.27	0.25	0.01
09/18/06 23:33:00	2.04	0.07	0.03	0.01
09/19/06 00:33:00	3.67	1.63	0.06	0.01
09/19/06 01:33:00	2.18	0.09	0.04	0.00
09/19/06 02:33:00	2.25	0.07	0.04	0.00
09/19/06 03:33:00	1.89	0.10	0.03	0.00
09/19/06 04:33:00	1.73	0.07	0.03	0.00
09/19/06 05:33:00	413.31	10.18	6.89	0.04
09/19/06 06:33:00	256.53	8.86	4.28	0.01
09/19/06 07:33:00	4.32	0.75	0.07	0.01
09/19/06 08:33:00	22.54	2.64	0.38	0.01
09/19/06 09:33:00	1.56	0.07	0.03	0.01
09/19/06 10:33:00	5.29	1.41	0.09	0.01
09/19/06 11:33:00	4.16	1.54	0.07	0.03
09/19/06 12:33:00	2.22	0.11	0.04	0.02
09/19/06 13:33:00	1.87	0.05	0.03	0.02
09/19/06 14:33:00	1.88	0.07	0.03	0.02
09/19/06 15:33:00	2.56	0.45	0.04	0.02
09/19/06 16:33:00	2.20	0.30	0.04	0.02
09/19/06 17:33:00	1.99	0.09	0.03	0.02
09/19/06 18:33:00	1.96	0.13	0.03	0.01
09/19/06 19:33:00	1.86	0.10	0.03	0.01
09/19/06 20:33:00	1.75	0.07	0.03	0.01
09/19/06 21:33:00	13.98	1.34	0.23	0.00

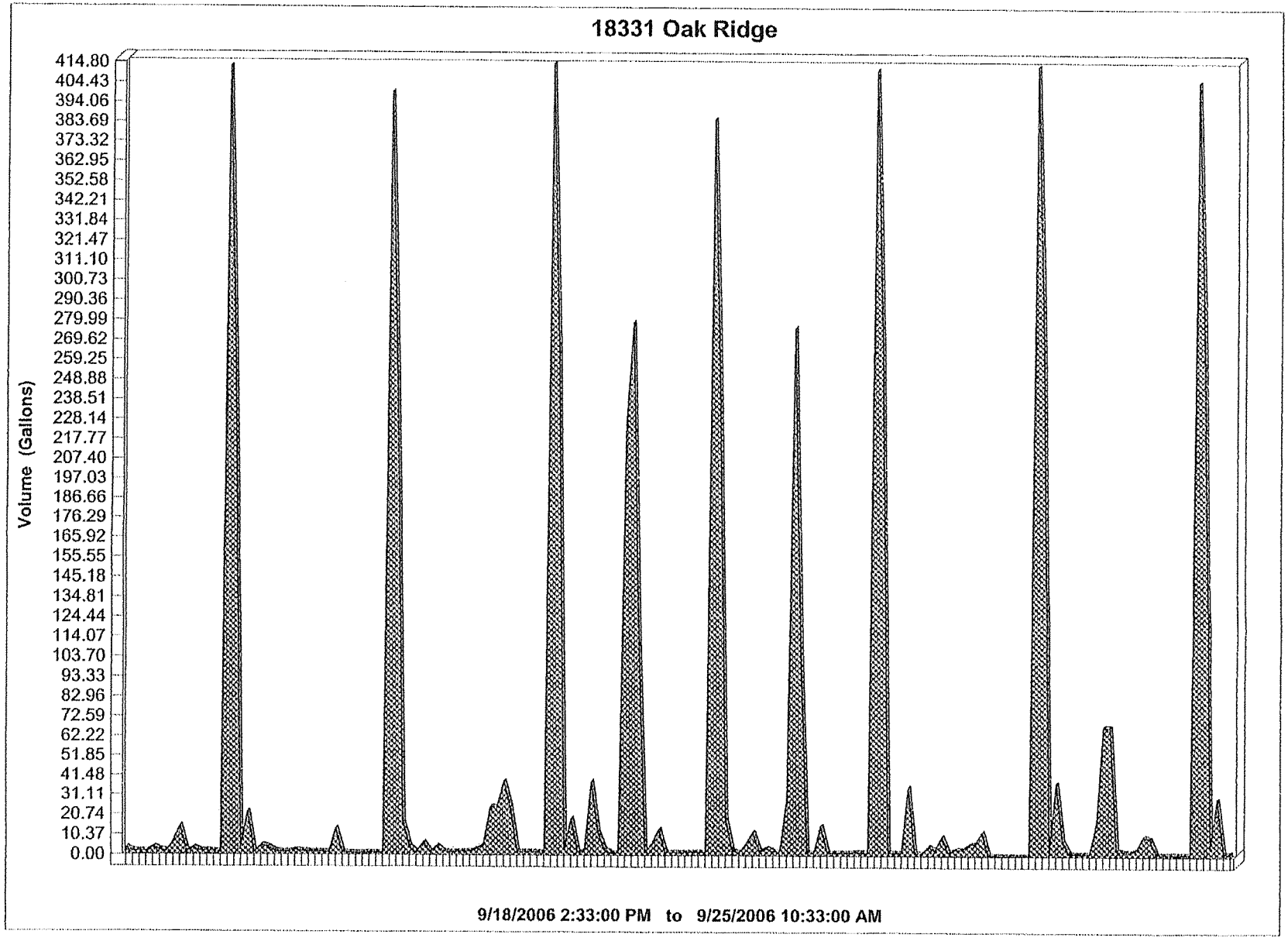
Date/Time	Volume	Maximum	Average	Minimum
09/19/06 22:33:00	1.72	0.07	0.03	0.01
09/19/06 23:33:00	1.38	0.07	0.02	0.00
09/20/06 00:33:00	1.15	0.08	0.02	0.00
09/20/06 01:33:00	1.26	0.06	0.02	0.00
09/20/06 02:33:00	1.54	0.06	0.03	0.00
09/20/06 03:33:00	1.45	0.11	0.02	0.00
09/20/06 04:33:00	1.52	0.07	0.03	0.00
09/20/06 05:33:00	399.84	9.92	6.66	0.01
09/20/06 06:33:00	249.07	8.44	4.15	0.01
09/20/06 07:33:00	17.14	2.56	0.29	0.01
09/20/06 08:33:00	4.58	1.36	0.08	0.01
09/20/06 09:33:00	1.67	0.06	0.03	0.01
09/20/06 10:33:00	6.92	1.24	0.12	0.01
09/20/06 11:33:00	1.88	0.05	0.03	0.03
09/20/06 12:33:00	4.96	1.38	0.08	0.02
09/20/06 13:33:00	1.97	0.05	0.03	0.02
09/20/06 14:33:00	1.94	0.07	0.03	0.03
09/20/06 15:33:00	1.96	0.06	0.03	0.03
09/20/06 16:33:00	2.08	0.08	0.04	0.02
09/20/06 17:33:00	2.22	0.21	0.04	0.03
09/20/06 18:33:00	3.57	0.67	0.06	0.00
09/20/06 19:33:00	5.94	0.56	0.10	0.01
09/20/06 20:33:00	25.30	3.89	0.42	0.00
09/20/06 21:33:00	25.10	3.36	0.42	0.01
09/20/06 22:33:00	38.96	3.93	0.65	0.00
09/20/06 23:33:00	24.88	3.41	0.41	0.01
09/21/06 00:33:00	1.98	0.08	0.03	0.01
09/21/06 01:33:00	2.14	0.07	0.04	0.01
09/21/06 02:33:00	2.17	0.08	0.04	0.01
09/21/06 03:33:00	1.84	0.07	0.03	0.01
09/21/06 04:33:00	1.86	0.12	0.03	0.01
09/21/06 05:33:00	415.07	10.27	6.92	0.04
09/21/06 06:33:00	263.27	8.89	4.39	0.02
09/21/06 07:33:00	3.50	1.78	0.06	0.01
09/21/06 08:33:00	19.32	2.55	0.32	0.01
09/21/06 09:33:00	1.62	0.07	0.03	0.01
09/21/06 10:33:00	2.89	1.06	0.05	0.01
09/21/06 11:33:00	38.93	3.89	0.65	0.01
09/21/06 12:33:00	12.15	3.37	0.20	0.01
09/21/06 13:33:00	3.25	1.22	0.05	0.01
09/21/06 14:33:00	1.31	0.05	0.02	0.00
09/21/06 15:33:00	1.37	0.05	0.02	0.01
09/21/06 16:33:00	226.75	4.74	3.78	0.01
09/21/06 17:33:00	279.64	4.71	4.66	4.64
09/21/06 18:33:00	111.00	4.67	1.85	0.01
09/21/06 19:33:00	1.77	0.05	0.03	0.01
09/21/06 20:33:00	6.38	1.69	0.11	0.01
09/21/06 21:33:00	13.84	1.36	0.23	0.01
09/21/06 22:33:00	1.73	0.06	0.03	0.01
09/21/06 23:33:00	1.78	0.07	0.03	0.01
09/22/06 00:33:00	1.80	0.09	0.03	0.01
09/22/06 01:33:00	1.73	0.05	0.03	0.00
09/22/06 02:33:00	1.95	0.07	0.03	0.01
09/22/06 03:33:00	2.06	0.07	0.03	0.01
09/22/06 04:33:00	2.06	0.08	0.03	0.00
09/22/06 05:33:00	385.96	9.90	6.43	0.05
09/22/06 06:33:00	238.66	8.23	3.98	0.01
09/22/06 07:33:00	19.07	2.68	0.32	0.01
09/22/06 08:33:00	2.70	0.88	0.05	0.01
09/22/06 09:33:00	1.59	0.05	0.03	0.01

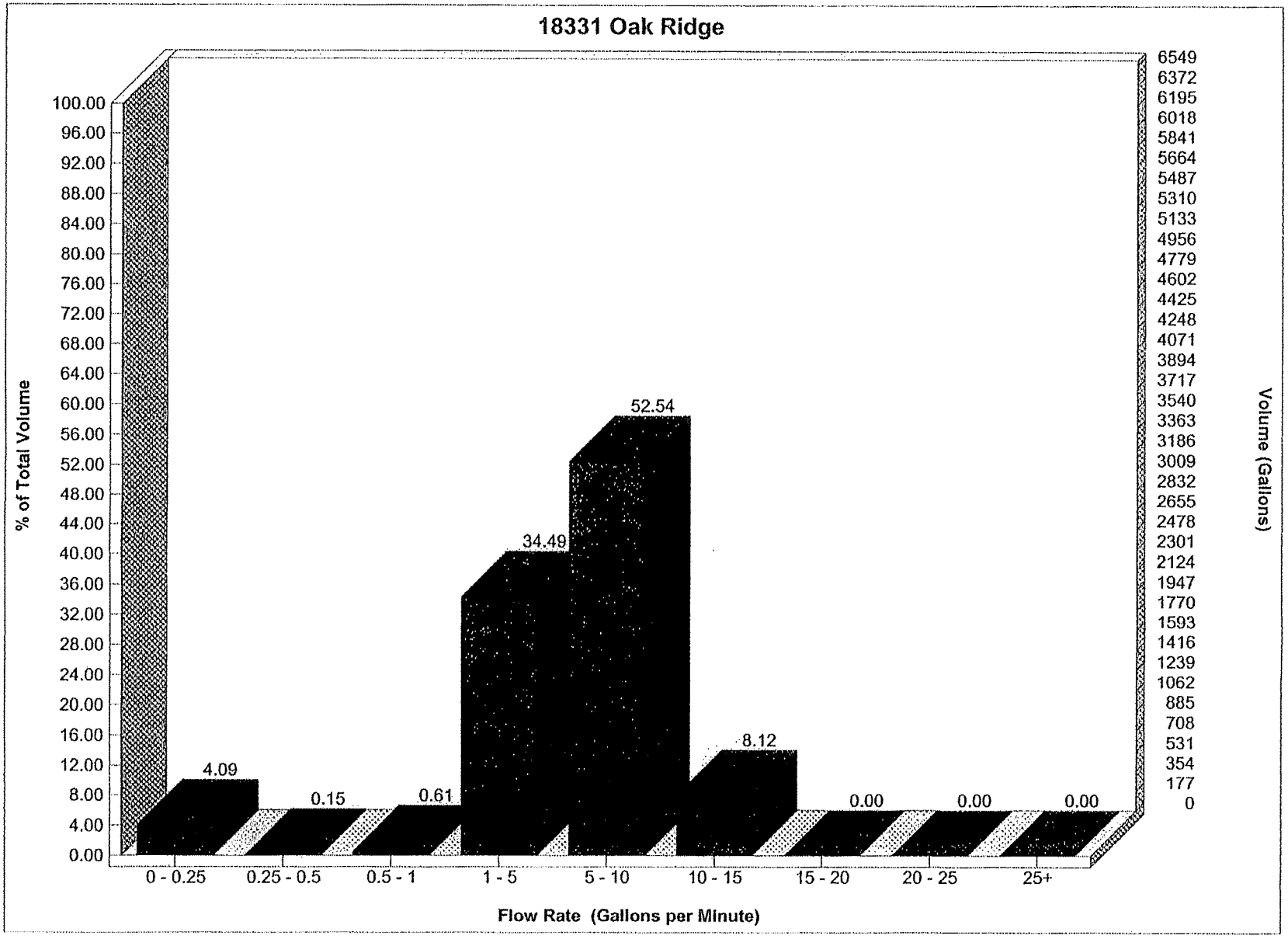
Date/Time	Volume	Maximum	Average	Minimum
09/22/06 10:33:00	6.54	1.31	0.11	0.01
09/22/06 11:33:00	12.47	1.43	0.21	0.03
09/22/06 12:33:00	2.58	0.22	0.04	0.03
09/22/06 13:33:00	4.02	1.43	0.07	0.03
09/22/06 14:33:00	2.48	0.21	0.04	0.03
09/22/06 15:33:00	2.10	0.05	0.04	0.03
09/22/06 16:33:00	29.99	4.56	0.50	0.03
09/22/06 17:33:00	276.95	5.41	4.62	4.50
09/22/06 18:33:00	109.33	4.61	1.82	0.01
09/22/06 19:33:00	1.95	0.09	0.03	0.01
09/22/06 20:33:00	1.77	0.06	0.03	0.01
09/22/06 21:33:00	15.83	1.83	0.26	0.01
09/22/06 22:33:00	1.85	0.08	0.03	0.00
09/22/06 23:33:00	1.84	0.07	0.03	0.01
09/23/06 00:33:00	1.93	0.07	0.03	0.00
09/23/06 01:33:00	1.93	0.06	0.03	0.01
09/23/06 02:33:00	2.20	0.08	0.04	0.01
09/23/06 03:33:00	2.10	0.07	0.04	0.01
09/23/06 04:33:00	1.94	0.08	0.03	0.01
09/23/06 05:33:00	412.17	10.54	6.87	0.05
09/23/06 06:33:00	262.66	8.65	4.38	0.02
09/23/06 07:33:00	2.08	0.07	0.04	0.01
09/23/06 08:33:00	1.91	0.07	0.03	0.01
09/23/06 09:33:00	2.02	0.07	0.03	0.01
09/23/06 10:33:00	36.25	2.72	0.60	0.01
09/23/06 11:33:00	1.70	0.10	0.03	0.01
09/23/06 12:33:00	1.54	0.07	0.03	0.00
09/23/06 13:33:00	5.17	1.78	0.09	0.00
09/23/06 14:33:00	2.99	1.24	0.05	0.00
09/23/06 15:33:00	10.37	1.04	0.17	0.01
09/23/06 16:33:00	2.03	0.24	0.03	0.01
09/23/06 17:33:00	3.64	1.04	0.06	0.02
09/23/06 18:33:00	3.54	1.75	0.06	0.00
09/23/06 19:33:00	5.97	1.87	0.10	0.00
09/23/06 20:33:00	6.86	1.99	0.11	0.00
09/23/06 21:33:00	12.67	1.32	0.21	0.00
09/23/06 22:33:00	0.44	0.04	0.01	0.00
09/23/06 23:33:00	0.62	0.04	0.01	0.00
09/24/06 00:33:00	0.31	0.05	0.00	0.00
09/24/06 01:33:00	0.49	0.05	0.01	0.00
09/24/06 02:33:00	0.28	0.03	0.00	0.00
09/24/06 03:33:00	0.40	0.03	0.01	0.00
09/24/06 04:33:00	0.67	0.07	0.01	0.00
09/24/06 05:33:00	414.67	10.65	6.91	0.00
09/24/06 06:33:00	264.49	8.54	4.41	0.00
09/24/06 07:33:00	0.63	0.05	0.01	0.00
09/24/06 08:33:00	38.63	2.52	0.64	0.01
09/24/06 09:33:00	7.89	1.33	0.13	0.01
09/24/06 10:33:00	1.65	0.06	0.03	0.01
09/24/06 11:33:00	1.63	0.05	0.03	0.01
09/24/06 12:33:00	1.60	0.06	0.03	0.01
09/24/06 13:33:00	1.61	0.05	0.03	0.01
09/24/06 14:33:00	17.22	2.30	0.29	0.01
09/24/06 15:33:00	68.52	4.14	1.14	0.01
09/24/06 16:33:00	68.11	4.27	1.13	0.01
09/24/06 17:33:00	3.40	0.68	0.06	0.01
09/24/06 18:33:00	2.58	0.08	0.04	0.03
09/24/06 19:33:00	2.50	0.09	0.04	0.03
09/24/06 20:33:00	3.90	0.24	0.06	0.03
09/24/06 21:33:00	10.70	2.67	0.18	0.01

Date/Time	Volume	Maximum	Average	Minimum
09/24/06 22:33:00	9.49	1.15	0.16	0.01
09/24/06 23:33:00	1.37	0.07	0.02	0.00
09/25/06 00:33:00	1.25	0.05	0.02	0.01
09/25/06 01:33:00	1.43	0.05	0.02	0.01
09/25/06 02:33:00	1.28	0.04	0.02	0.01
09/25/06 03:33:00	1.24	0.05	0.02	0.01
09/25/06 04:33:00	1.37	0.09	0.02	0.01
09/25/06 05:33:00	406.54	10.59	6.78	0.01
09/25/06 06:33:00	257.77	8.42	4.30	0.01
09/25/06 07:33:00	4.91	1.76	0.08	0.01
09/25/06 08:33:00	30.04	3.99	0.50	0.01
09/25/06 09:33:00	1.55	0.06	0.03	0.01
09/25/06 10:33:00	2.28	0.79	0.04	0.01

Data Summary

Cumulative Volume	6,584.78
Maximum Volume	415.07
Maximum Flow Rate	10.65
Average Flow Rate	0.67
Minimum Flow Rate	0.00


18331 Oak Ridge
Volume (Gallons)
414.80
404.43
394.06
383.69
373.32
362.95
352.58
342.21
331.84
321.47
311.10
300.73
290.36
279.99
269.62
259.25
248.88
238.51
228.14
217.77
207.40
197.03
186.66
176.29
165.92
155.55
145.18
134.81
124.44
114.07
103.70
93.33
82.96
72.59
62.22
51.85
41.48
31.11
20.74
10.37
0.00
9/18/2006 2:33:00 PM to 9/25/2006 10:33:00 AM


18331 Oak Ridge
% of Total Volume
100.00
96.00
92.00
88.00
84.00
80.00
76.00
72.00
68.00
64.00
60.00
56.00
52.00
48.00
44.00
40.00
36.00
32.00
28.00
24.00
20.00
16.00
12.00
8.00
4.00
0.00
4.09
0.15
0.61
34.49
52.54
8.12
0.00
0.00
0.00
0 - 0.25
0.25 - 0.5
0.5 - 1
1 - 5
5 - 10
10 - 15
15 - 20
20 - 25
25+
Flow Rate (Gallons per Minute)
Volume (Gallons)
6549
6372
6195
6018
5841
5664
5487
5310
5133
4956
4779
4602
4425
4248
4071
3894
3717
3540
3363
3186
3009
2832
2655
2478
2301
2124
1947
1770
1593
1416
1239
1062
885
708
531
354
177
0

Data File Nam C:\PROGRAMF\MMV30\TUSTINCL.MDB

Flow Report

Location Information

ID 7
Name City of Tustin
Address 13201 Crestline
City Tustin
State/Prov CA
Postal Code
Phone
Notes

Meter Information

Make Badger
Model Recordall PD
Size Model 25
Unit Gallons

Grid Interval 3,600 Seconds
Max-Min Interval 60 Seconds

Date/Time	Volume	Maximum	Average	Minimum
09/18/06 14:17:46	7.15	1.61	0.12	0.00
09/18/06 15:17:46	5.02	1.29	0.08	0.00
09/18/06 16:17:46	0.54	0.06	0.01	0.00
09/18/06 17:17:46	2.32	0.80	0.04	0.00
09/18/06 18:17:46	7.51	2.01	0.13	0.00
09/18/06 19:17:46	11.52	1.49	0.19	0.00
09/18/06 20:17:46	3.38	2.21	0.06	0.00
09/18/06 21:17:46	9.90	1.74	0.17	0.00
09/18/06 22:17:46	0.32	0.22	0.00	0.00
09/18/06 23:17:46	0.05	0.01	0.00	0.00
09/19/06 00:17:46	1.52	0.72	0.03	0.00
09/19/06 01:17:46	0.06	0.01	0.00	0.00
09/19/06 02:17:46	0.04	0.00	0.00	0.00
09/19/06 03:17:46	0.08	0.01	0.00	0.00
09/19/06 04:17:46	0.13	0.01	0.00	0.00
09/19/06 05:17:46	0.13	0.01	0.00	0.00
09/19/06 06:17:46	172.62	8.29	2.88	0.00
09/19/06 07:17:46	592.07	12.20	9.87	6.91
09/19/06 08:17:46	645.81	14.71	10.76	5.66
09/19/06 09:17:46	199.80	11.95	3.33	0.00
09/19/06 10:17:46	16.03	3.51	0.27	0.00
09/19/06 11:17:46	19.32	1.65	0.32	0.00
09/19/06 12:17:46	0.09	0.01	0.00	0.00
09/19/06 13:17:46	0.16	0.01	0.00	0.00
09/19/06 14:17:46	2.50	2.14	0.04	0.00
09/19/06 15:17:46	2.31	1.08	0.04	0.00
09/19/06 16:17:46	0.54	0.06	0.01	0.00
09/19/06 17:17:46	2.96	2.38	0.05	0.00
09/19/06 18:17:46	2.09	1.61	0.04	0.00
09/19/06 19:17:46	3.93	1.25	0.06	0.00
09/19/06 20:17:46	0.42	0.11	0.01	0.00
09/19/06 21:17:46	6.47	2.09	0.11	0.00

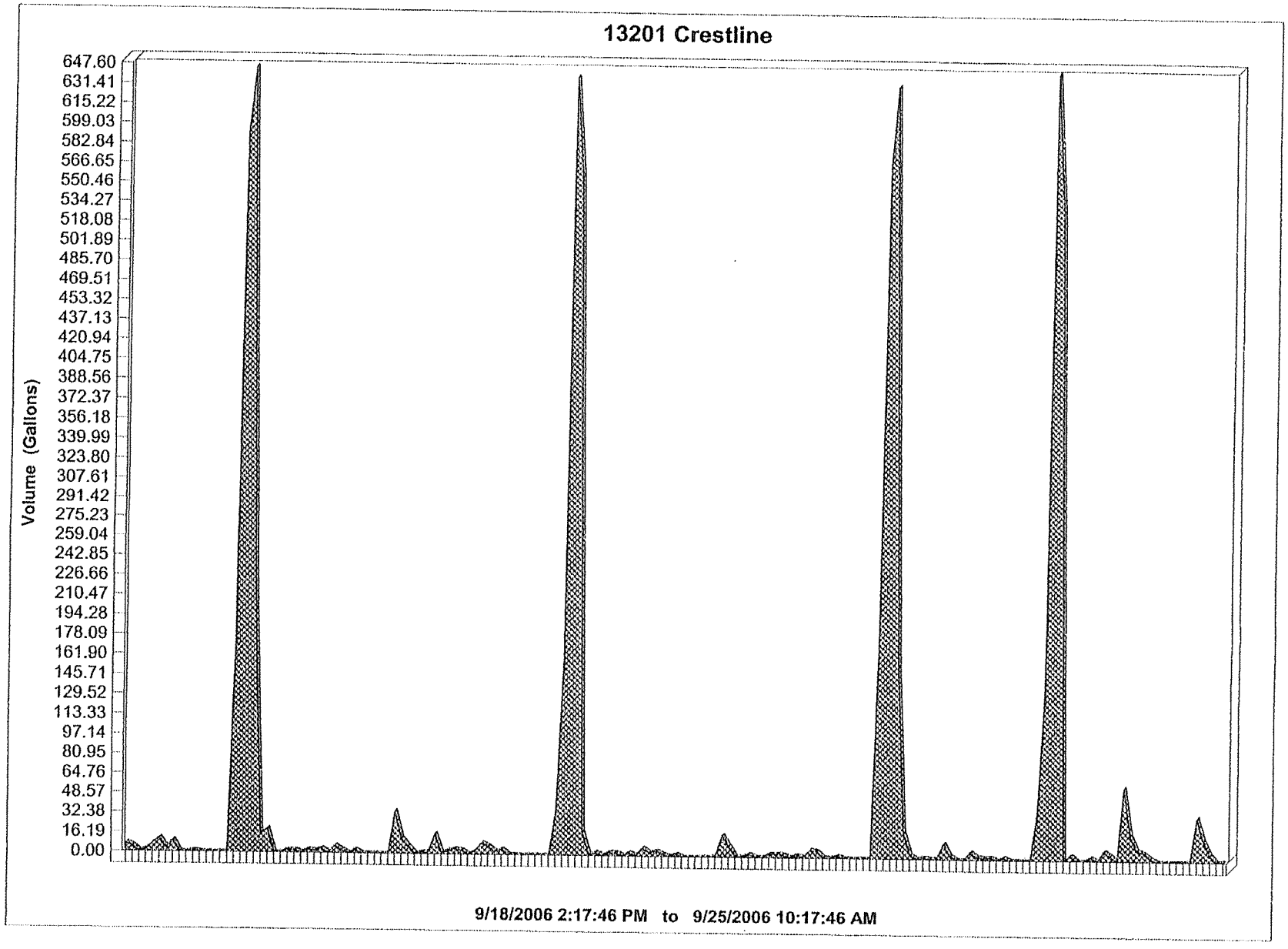
Date/Time	Volume	Maximum	Average	Minimum
09/19/06 22:17:46	2.94	1.30	0.05	0.00
09/19/06 23:17:46	0.03	0.00	0.00	0.00
09/20/06 00:17:46	3.02	1.15	0.05	0.00
09/20/06 01:17:46	0.15	0.03	0.00	0.00
09/20/06 02:17:46	0.03	0.00	0.00	0.00
09/20/06 03:17:46	0.02	0.00	0.00	0.00
09/20/06 04:17:46	0.02	0.00	0.00	0.00
09/20/06 05:17:46	0.01	0.00	0.00	0.00
09/20/06 06:17:46	34.81	11.67	0.58	0.00
09/20/06 07:17:46	12.94	2.12	0.22	0.00
09/20/06 08:17:46	6.43	1.96	0.11	0.00
09/20/06 09:17:46	0.30	0.05	0.00	0.00
09/20/06 10:17:46	1.61	0.83	0.03	0.00
09/20/06 11:17:46	1.57	1.00	0.03	0.00
09/20/06 12:17:46	16.61	4.85	0.28	0.00
09/20/06 13:17:46	1.16	0.50	0.02	0.00
09/20/06 14:17:46	3.12	1.71	0.05	0.00
09/20/06 15:17:46	4.58	1.75	0.08	0.00
09/20/06 16:17:46	3.51	2.25	0.06	0.00
09/20/06 17:17:46	0.07	0.01	0.00	0.00
09/20/06 18:17:46	3.18	1.99	0.05	0.00
09/20/06 19:17:46	9.67	1.45	0.16	0.00
09/20/06 20:17:46	7.12	1.83	0.12	0.00
09/20/06 21:17:46	2.80	1.46	0.05	0.00
09/20/06 22:17:46	4.74	1.98	0.08	0.00
09/20/06 23:17:46	0.35	0.05	0.01	0.00
09/21/06 00:17:46	0.01	0.00	0.00	0.00
09/21/06 01:17:46	0.00	0.00	0.00	0.00
09/21/06 02:17:46	0.01	0.00	0.00	0.00
09/21/06 03:17:46	0.02	0.00	0.00	0.00
09/21/06 04:17:46	0.03	0.00	0.00	0.00
09/21/06 05:17:46	0.03	0.00	0.00	0.00
09/21/06 06:17:46	35.66	11.76	0.59	0.00
09/21/06 07:17:46	158.72	8.44	2.64	0.00
09/21/06 08:17:46	640.56	12.63	10.68	7.46
09/21/06 09:17:46	557.84	15.07	9.30	0.01
09/21/06 10:17:46	19.45	3.66	0.32	0.00
09/21/06 11:17:46	1.29	0.79	0.02	0.00
09/21/06 12:17:46	2.95	2.13	0.05	0.00
09/21/06 13:17:46	0.54	0.03	0.01	0.00
09/21/06 14:17:46	3.07	1.20	0.05	0.00
09/21/06 15:17:46	2.98	2.64	0.05	0.00
09/21/06 16:17:46	0.63	0.10	0.01	0.00
09/21/06 17:17:46	3.10	1.57	0.05	0.00
09/21/06 18:17:46	0.98	0.12	0.02	0.00
09/21/06 19:17:46	7.18	1.95	0.12	0.00
09/21/06 20:17:46	3.22	1.36	0.05	0.00
09/21/06 21:17:46	4.85	1.67	0.08	0.00
09/21/06 22:17:46	2.21	1.84	0.04	0.00
09/21/06 23:17:46	0.44	0.31	0.01	0.00
09/22/06 00:17:46	2.45	1.38	0.04	0.00
09/22/06 01:17:46	0.06	0.01	0.00	0.00
09/22/06 02:17:46	0.07	0.02	0.00	0.00
09/22/06 03:17:46	0.10	0.03	0.00	0.00
09/22/06 04:17:46	0.28	0.02	0.00	0.00
09/22/06 05:17:46	0.27	0.02	0.00	0.00
09/22/06 06:17:46	1.10	0.38	0.02	0.00
09/22/06 07:17:46	17.96	1.68	0.30	0.00
09/22/06 08:17:46	9.69	1.95	0.16	0.00
09/22/06 09:17:46	0.82	0.13	0.01	0.00

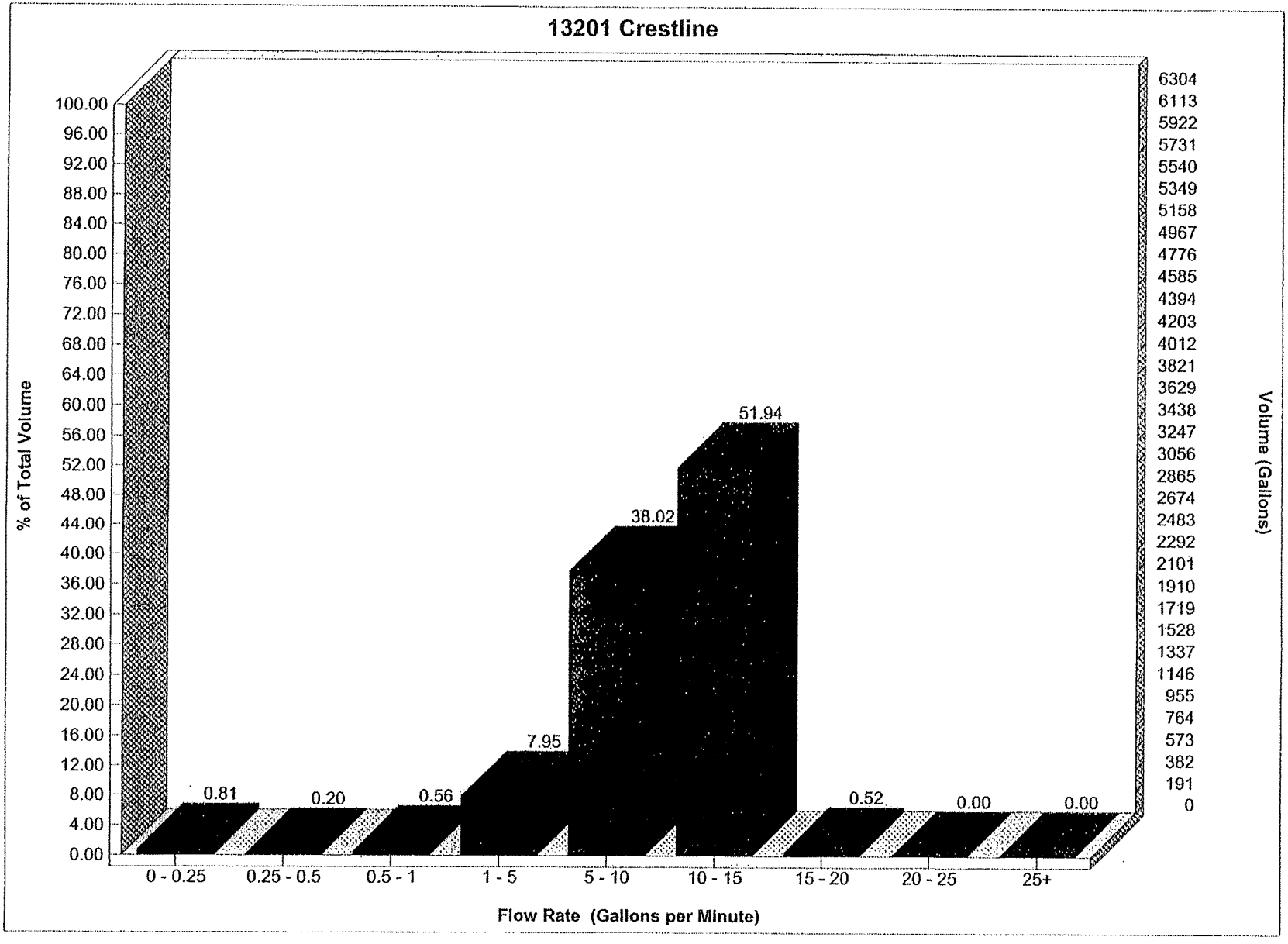
Date/Time	Volume	Maximum	Average	Minimum
09/22/06 10:17:46	0.58	0.04	0.01	0.00
09/22/06 11:17:46	2.81	2.06	0.05	0.00
09/22/06 12:17:46	0.66	0.03	0.01	0.00
09/22/06 13:17:46	0.51	0.03	0.01	0.00
09/22/06 14:17:46	3.31	1.99	0.05	0.00
09/22/06 15:17:46	3.19	1.47	0.05	0.00
09/22/06 16:17:46	2.96	1.49	0.05	0.00
09/22/06 17:17:46	0.45	0.05	0.01	0.00
09/22/06 18:17:46	2.43	1.25	0.04	0.00
09/22/06 19:17:46	0.89	0.17	0.01	0.00
09/22/06 20:17:46	6.84	1.25	0.11	0.00
09/22/06 21:17:46	5.78	1.63	0.10	0.00
09/22/06 22:17:46	0.77	0.10	0.01	0.00
09/22/06 23:17:46	0.06	0.01	0.00	0.00
09/23/06 00:17:46	2.39	1.89	0.04	0.00
09/23/06 01:17:46	0.01	0.00	0.00	0.00
09/23/06 02:17:46	0.04	0.00	0.00	0.00
09/23/06 03:17:46	0.01	0.00	0.00	0.00
09/23/06 04:17:46	0.01	0.00	0.00	0.00
09/23/06 05:17:46	0.01	0.00	0.00	0.00
09/23/06 06:17:46	176.18	8.30	2.94	0.00
09/23/06 07:17:46	569.60	12.27	9.49	7.67
09/23/06 08:17:46	635.91	13.74	10.60	5.07
09/23/06 09:17:46	157.51	9.79	2.63	0.00
09/23/06 10:17:46	21.97	1.89	0.37	0.00
09/23/06 11:17:46	3.63	2.07	0.06	0.00
09/23/06 12:17:46	0.23	0.05	0.00	0.00
09/23/06 13:17:46	1.83	0.90	0.03	0.00
09/23/06 14:17:46	0.67	0.19	0.01	0.00
09/23/06 15:17:46	0.30	0.05	0.00	0.00
09/23/06 16:17:46	13.68	1.66	0.23	0.00
09/23/06 17:17:46	3.18	1.22	0.05	0.00
09/23/06 18:17:46	0.09	0.01	0.00	0.00
09/23/06 19:17:46	0.11	0.01	0.00	0.00
09/23/06 20:17:46	6.60	1.32	0.11	0.00
09/23/06 21:17:46	2.69	1.26	0.05	0.00
09/23/06 22:17:46	2.06	2.01	0.03	0.00
09/23/06 23:17:46	2.52	2.09	0.04	0.00
09/24/06 00:17:46	0.01	0.00	0.00	0.00
09/24/06 01:17:46	2.33	2.06	0.04	0.00
09/24/06 02:17:46	0.07	0.00	0.00	0.00
09/24/06 03:17:46	0.07	0.01	0.00	0.00
09/24/06 04:17:46	0.10	0.01	0.00	0.00
09/24/06 05:17:46	0.09	0.01	0.00	0.00
09/24/06 06:17:46	37.28	11.79	0.62	0.00
09/24/06 07:17:46	140.67	6.88	2.35	0.00
09/24/06 08:17:46	647.90	13.21	10.80	7.19
09/24/06 09:17:46	533.84	15.20	8.90	0.00
09/24/06 10:17:46	0.49	0.14	0.01	0.00
09/24/06 11:17:46	4.85	1.46	0.08	0.00
09/24/06 12:17:46	0.18	0.02	0.00	0.00
09/24/06 13:17:46	0.09	0.01	0.00	0.00
09/24/06 14:17:46	2.95	1.84	0.05	0.00
09/24/06 15:17:46	0.03	0.00	0.00	0.00
09/24/06 16:17:46	8.19	3.32	0.14	0.00
09/24/06 17:17:46	4.80	1.75	0.08	0.00
09/24/06 18:17:46	0.05	0.00	0.00	0.00
09/24/06 19:17:46	60.29	6.38	1.00	0.00
09/24/06 20:17:46	21.31	1.68	0.35	0.00
09/24/06 21:17:46	9.14	1.96	0.15	0.00

Date/Time	Volume	Maximum	Average	Minimum
09/24/06 22:17:46	6.96	1.63	0.12	0.00
09/24/06 23:17:46	2.93	1.93	0.05	0.00
09/25/06 00:17:46	0.07	0.05	0.00	0.00
09/25/06 01:17:46	0.05	0.02	0.00	0.00
09/25/06 02:17:46	0.00	0.00	0.00	0.00
09/25/06 03:17:46	0.02	0.00	0.00	0.00
09/25/06 04:17:46	0.18	0.02	0.00	0.00
09/25/06 05:17:46	0.17	0.03	0.00	0.00
09/25/06 06:17:46	36.14	11.54	0.60	0.00
09/25/06 07:17:46	17.58	1.59	0.29	0.00
09/25/06 08:17:46	6.13	2.03	0.10	0.00
09/25/06 09:17:46	0.49	0.06	0.01	0.00
09/25/06 10:17:46	0.77	0.10	0.01	0.00

Data Summary

Cumulative Volume	6,494.82
Maximum Volume	647.90
Maximum Flow Rate	15.20
Average Flow Rate	0.66
Minimum Flow Rate	0.00


13201 Crestline
Volume (Gallons)
647.60
631.41
615.22
599.03
582.84
566.65
550.46
534.27
518.08
501.89
485.70
469.51
453.32
437.13
420.94
404.75
388.56
372.37
356.18
339.99
323.80
307.61
291.42
275.23
259.04
242.85
226.66
210.47
194.28
178.09
161.90
145.71
129.52
113.33
97.14
80.95
64.76
48.57
32.38
16.19
0.00
9/18/2006 2:17:46 PM to 9/25/2006 10:17:46 AM


13201 Crestline
% of Total Volume
100.00
96.00
92.00
88.00
84.00
80.00
76.00
72.00
68.00
64.00
60.00
56.00
52.00
48.00
44.00
40.00
36.00
32.00
28.00
24.00
20.00
16.00
12.00
8.00
4.00
0.00
0.81
0.20
0.56
7.95
38.02
51.94
0.52
0.00
0.00
0 - 0.25
0.25 - 0.5
0.5 - 1
1 - 5
5 - 10
10 - 15
15 - 20
20 - 25
25+
Flow Rate (Gallons per Minute)
Volume (Gallons)
6304
6113
5922
5731
5540
5349
5158
4967
4776
4585
4394
4203
4012
3821
3629
3438
3247
3056
2865
2674
2483
2292
2101
1910
1719
1528
1337
1146
955
764
573
382
191
0

APPENDIX E

Accuracy Test Results
for the
City of Tustin

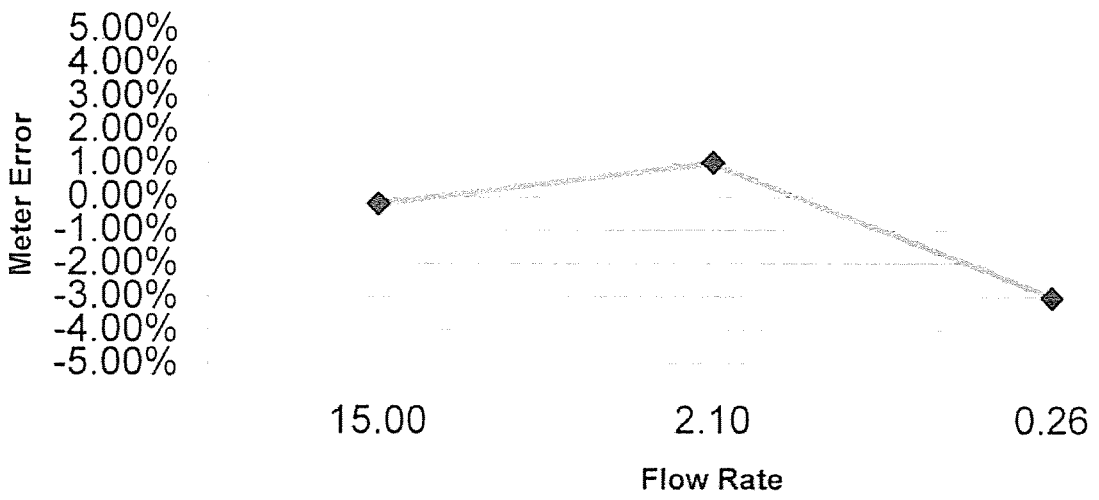
Measurement Control Systems

1331 S. Lyon Street
Santa Ana, California 92705
714 835-0995 800-826-1682
Fax 714 835-1103
www.mcsmeters.com

Meter Accuracy Certificate

Customer:	City of Tustin			S/N -	76589742
Location				Date	10/10/06
Meter Size	Neptune, 5/8x3/4"			Job No.	83318
Type	T-10		Totalizer Reading	RGA No.	214324
Register	Cubic Feet	Test Only	4216 x100 CF	Tested By	RB 00913

GPM Flow Rate	Test Qty	Start Reading	End Reading	Net	Meter Error *percent*	Meter Accuracy *percent*	Accuracy Limits *percent*	Pass or Fail Status
15.00	13.368	42124.500	42137.840	13.340	-0.21%	99.790%	98.5-101.5	PASS
2.10	1.337	42159.000	42160.351	1.351	1.02%	101.024%	98.5-101.5	PASS
0.26	1.377	42168.305	42169.640	1.335	-3.04%	96.956%	95.0-101.0	PASS
			Average Meter Error			-0.74%		



Remarks:	Approved By:

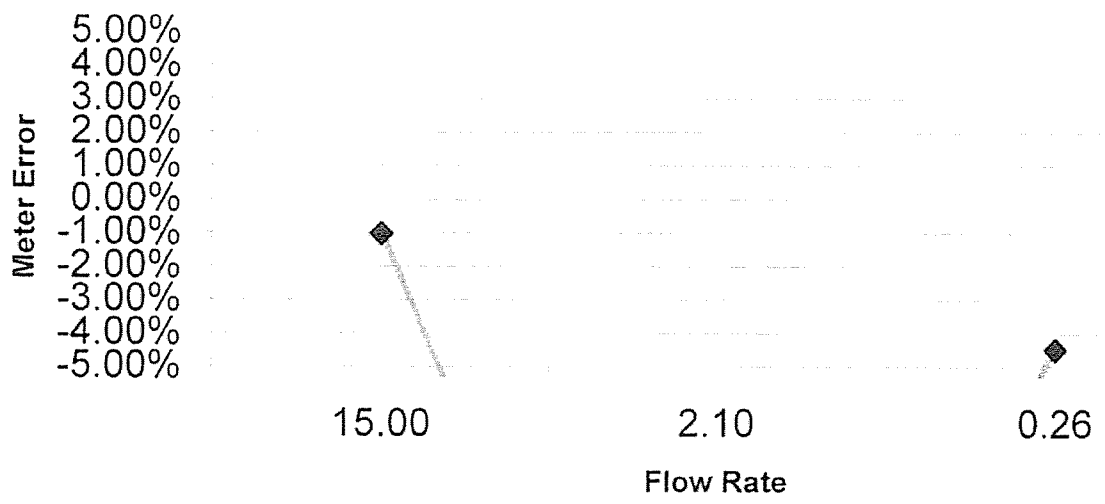
Measurement Control Systems

1331 S. Lyon Street
Santa Ana, California 92705
714 835-0995 800-826-1682
Fax 714 835-1103
www.mcsmeters.com

Meter Accuracy Certificate

Customer:	City of Tustin			S/N -	40040807
Location				Date	10/10/06
Meter Size	Neptune, 5/8x3/4"			Job No.	83318
Type	T-10		Totalizer Reading	RGA No.	214324
Register	Cubic Feet	Test Only	1700 x100 CF	Tested By	RB 00913

GPM Flow Rate	Test Qty	Start Reading	End Reading	Net	Meter Error *percent*	Meter Accuracy *percent*	Accuracy Limits *percent*	Pass or Fail Status
15.00	13.368	169991.610	170004.840	13.230	-1.03%	98.967%	98.5-101.5	PASS
2.10	1.337	170025.500	170026.505	1.005	-24.82%	75.179%	98.5-101.5	FAIL
0.26	1.377	170034.500	170035.815	1.315	-4.50%	95.504%	95.0-101.0	PASS
			Average Meter Error			-10.12%		



Remarks:	Approved By:

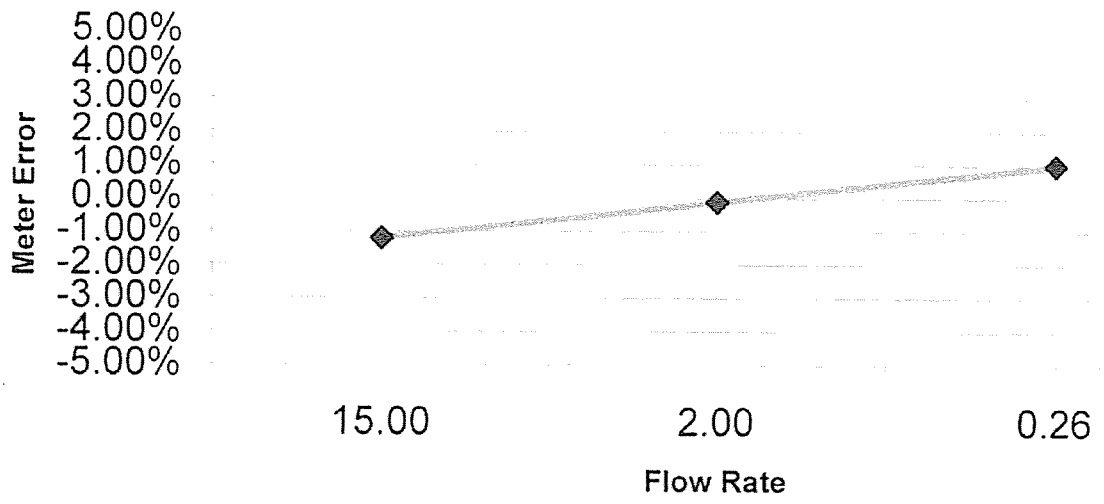
Measurement Control Systems

1331 S. Lyon Street
Santa Ana, California 92705
714 835-0995 800-826-1682
Fax 714 835-1103
www.mcsmeters.com

Meter Accuracy Certificate

Customer:	City of Tustin			S/N -	97929917
Location				Date	10/10/06
Meter Size	Badger, 5/8x3/4"			Job No.	83318
Type	Recordall		Totalizer Reading	RGA No.	214324
Register	Cubic Feet	Test Only	1711 x100 CF	Tested By	RB 00913

GPM Flow Rate	Test Qty	Start Reading	End Reading	Net	Meter Error *percent*	Meter Accuracy *percent*	Accuracy Limits *percent*	Pass or Fail Status
15.00	13.368	171183.000	171196.205	13.205	-1.22%	98.780%	98.5-101.5	PASS
2.00	1.337	171197.200	171198.535	1.335	-0.14%	99.865%	98.5-101.5	PASS
0.26	1.337	171199.000	171200.350	1.350	0.99%	100.987%	95.0-101.0	PASS
			Average Meter Error			-0.12%		



Remarks:

Approved By:

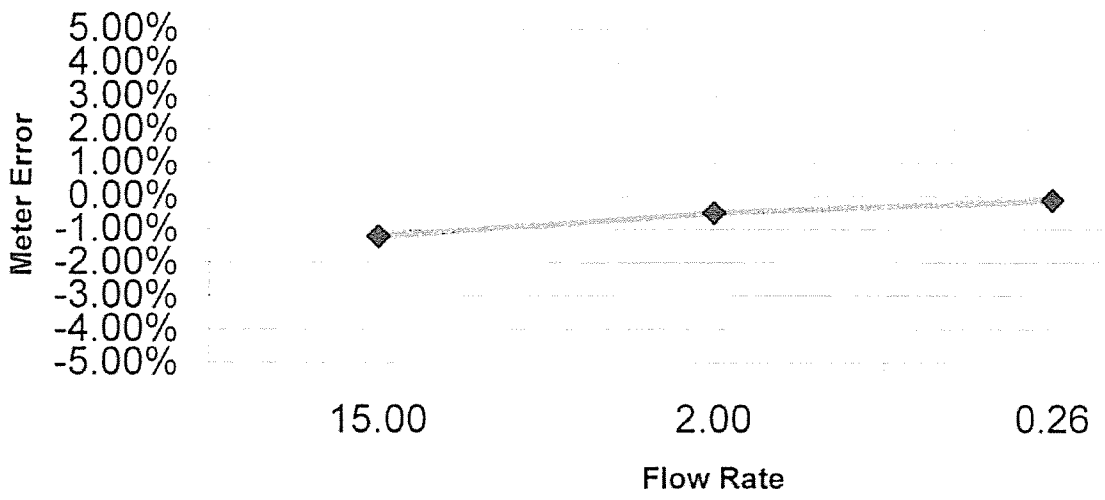
Measurement Control Systems

1331 S. Lyon Street
Santa Ana, California 92705
714 835-0995 800-826-1682
Fax 714 835-1103
www.mcsmeters.com

Meter Accuracy Certificate

Customer:	City of Tustin			S/N -	99068753
Location				Date	10/10/06
Meter Size	Badger, 5/8x3/4"			Job No.	83318
Type	Recordall		Totalizer Reading	RGA No.	214324
Register	Cubic Feet	Test Only	2008 x100 CF	Tested By	RB 00913

GPM Flow Rate	Test Qty	Start Reading	End Reading	Net	Meter Error *percent*	Meter Accuracy *percent*	Accuracy Limits *percent*	Pass or Fail Status
15.00	13.368	200845.000	200858.205	13.205	-1.22%	98.780%	98.5-101.5	PASS
2.00	1.337	200859.250	200860.580	1.330	-0.51%	99.491%	98.5-101.5	PASS
0.26	1.337	200861.200	200862.535	1.335	-0.14%	99.865%	95.0-101.0	PASS
			Average Meter Error			-0.62%		



Remarks:	Approved By:

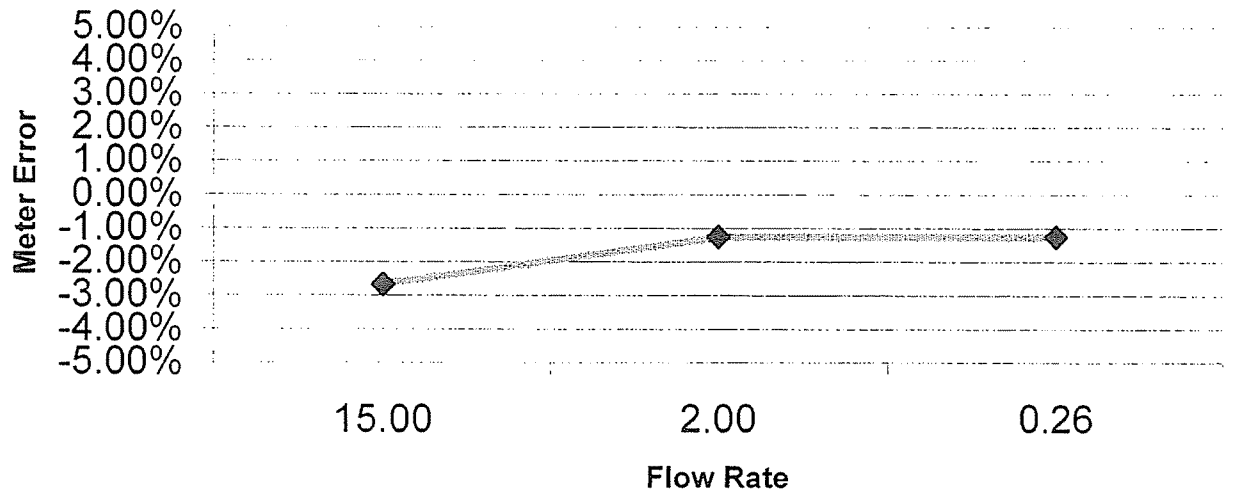
Measurement Control Systems

1331 S. Lyon Street
Santa Ana, California 92705
714 835-0995 800-826-1682
Fax 714 835-1103
www.mcsmeters.com

Meter Accuracy Certificate

Customer:	City of Tustin			S/N -	96024152
Location				Date	10/10/06
Meter Size	Badger, 5/8x3/4"			Job No.	83318
Type	Recordall		Totalizer Reading	RGA No.	214324
Register	Cubic Feet	Test Only	3281 x100 CF	Tested By	RB 00913

GPM Flow Rate	Test Qty	Start Reading	End Reading	Net	Meter Error *percent*	Meter Accuracy *percent*	Accuracy Limits *percent*	Pass or Fail Status
15.00	13.368	328120.000	328133.010	13.010	-2.68%	97.321%	98.5-101.5	FAIL
2.00	1.337	328134.000	328135.320	1.320	-1.26%	98.743%	98.5-101.5	PASS
0.26	1.337	328135.500	328136.820	1.320	-1.26%	98.743%	95.0-101.0	PASS
			Average Meter Error			-1.73%		



Remarks:

Approved By:

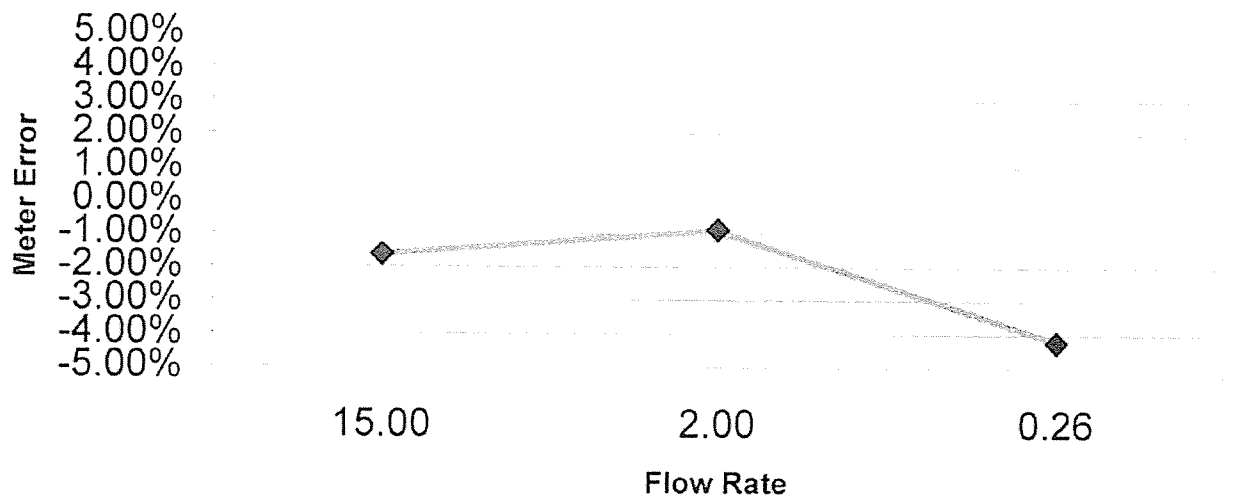
Measurement Control Systems

1331 S. Lyon Street
Santa Ana, California 92705
714 835-0995 800-826-1682
Fax 714 835-1103
www.mcsmeters.com

Meter Accuracy Certificate

Customer:	City of Tustin			S/N -	97964254
Location				Date	10/10/06
Meter Size	Badger, 5/8x3/4"			Job No.	83318
Type	Recordall		Totalizer Reading	RGA No.	214324
Register	Cubic Feet	Test Only	3449 x100 CF	Tested By	RB 00913

GPM Flow Rate	Test Qty	Start Reading	End Reading	Net	Meter Error *percent*	Meter Accuracy *percent*	Accuracy Limits *percent*	Pass or Fail Status
15.00	13.368	344983.700	344996.850	13.150	-1.63%	98.369%	98.5-101.5	FAIL
2.00	1.337	344998.000	344999.325	1.325	-0.88%	99.117%	98.5-101.5	PASS
0.26	1.337	344999.600	345000.880	1.280	-4.25%	95.750%	95.0-101.0	PASS
			Average Meter Error			-2.25%		



Remarks:	Approved By:

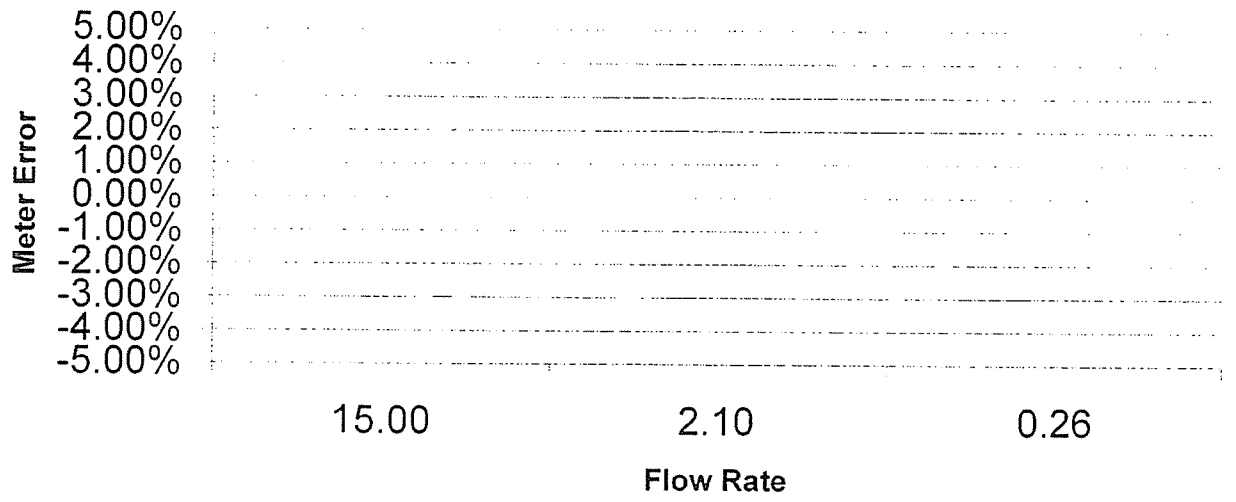
Measurement Control Systems

1331 S. Lyon Street
Santa Ana, California 92705
714 835-0995 800-826-1682
Fax 714 835-1103
www.mcsmeters.com

Meter Accuracy Certificate

Customer:	City of Tustin			S/N -	37608667
Location				Date	10/10/06
Meter Size	Neptune, 5/8x3/4"			Job No.	83318
Type	T-10		Totalizer Reading	RGA No.	214324
Register	Cubic Feet	Test Only	3108 x100 CF	Tested By	RB 00913

GPM Flow Rate	Test Qty	Start Reading	End Reading	Net	Meter Error *percent*	Meter Accuracy *percent*	Accuracy Limits *percent*	Pass or Fail Status
15.00	13.368	310854.350	310866.890	12.540	-6.19%	93.805%	98.5-101.5	FAIL
2.10	1.337	310887.000	310888.225	1.225	-8.36%	91.636%	98.5-101.5	FAIL
0.26	1.377	310895.500	310896.470	0.970	-29.55%	70.448%	95.0-101.0	FAIL
			Average Meter Error			-14.70%		



Remarks:	Approved By:

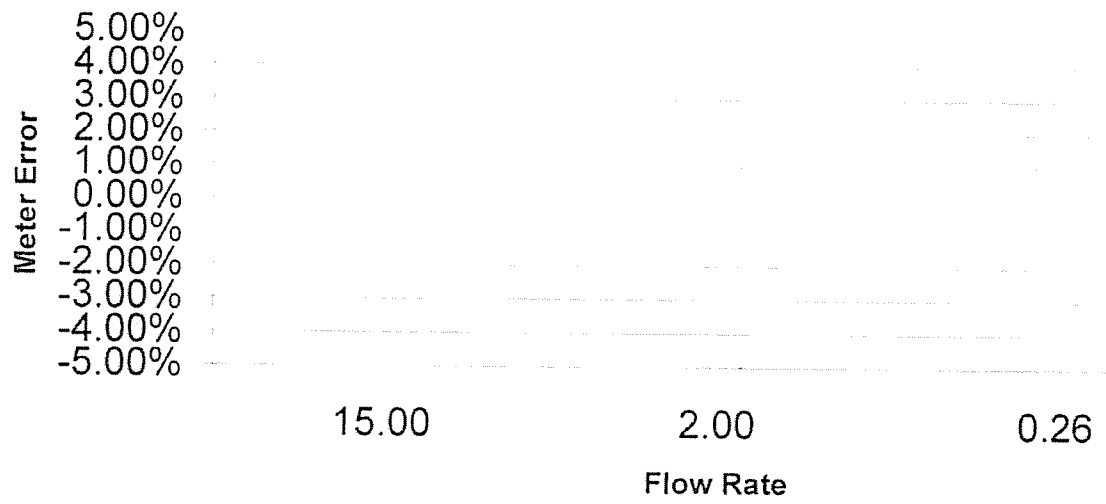
Measurement Control Systems

1331 S. Lyon Street
Santa Ana, California 92705
714 835-0995 800-826-1682
Fax 714 835-1103
www.mcsmeters.com

Meter Accuracy Certificate

Customer:	City of Tustin			S/N -	96284123
Location				Date	10/10/06
Meter Size	Badger, 5/8x3/4"			Job No.	83318
Type	Recordall		Totalizer Reading	RGA No.	214324
Register	Cubic Feet	Test Only	1661 x100 CF	Tested By	RB 00913

GPM Flow Rate	Test Qty	Start Reading	End Reading	Net	Meter Error *percent*	Meter Accuracy *percent*	Accuracy Limits *percent*	Pass or Fail Status
15.00	13.368	166111.000	166123.295	12.295	-8.03%	91.973%	98.5-101.5	FAIL
2.00	1.337	166124.250	166125.505	1.255	-6.12%	93.880%	98.5-101.5	FAIL
0.26	1.337	166126.000	166126.950	0.950	-28.94%	71.065%	95.0-101.0	FAIL
			Average Meter Error			-14.36%		



Remarks:	Approved By:

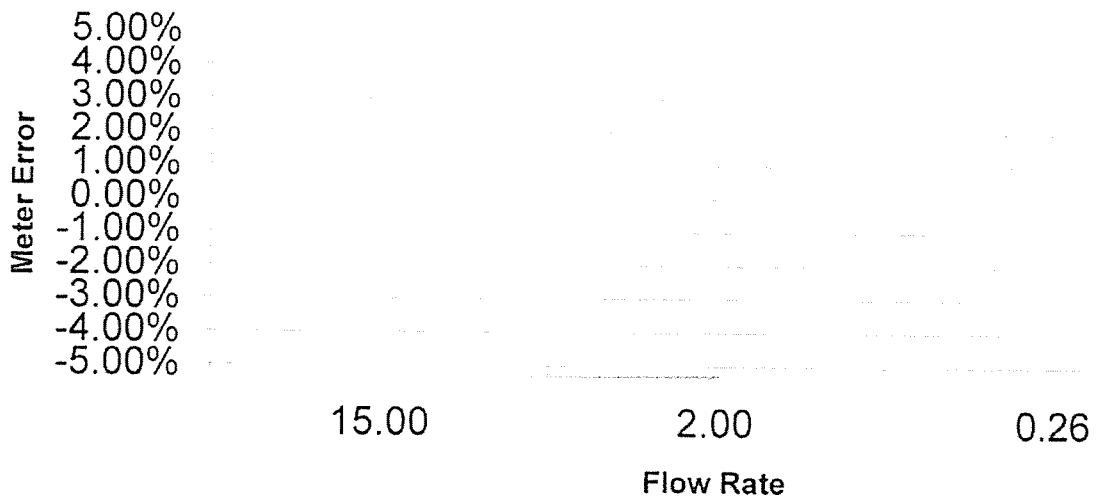
Measurement Control Systems

1331 S. Lyon Street
Santa Ana, California 92705
714 835-0995 800-826-1682
Fax 714 835-1103
www.mcsmeters.com

Meter Accuracy Certificate

Customer:	City of Tustin			S/N -	91162912
Location				Date	10/10/06
Meter Size	Badger, 5/8x3/4"			Job No.	83318
Type	Recordall		Totalizer Reading	RGA No.	214324
Register	Cubic Feet	Test Only	1533 x100 CF	Tested By	RB 00913

GPM Flow Rate	Test Qty	Start Reading	End Reading	Net	Meter Error *percent*	Meter Accuracy *percent*	Accuracy Limits *percent*	Pass or Fail Status
15.00	13.368	153314.100	153326.735	12.635	-5.48%	94.516%	98.5-101.5	FAIL
2.00	1.337	153328.000	153329.265	1.265	-5.37%	94.628%	98.5-101.5	FAIL
0.26	1.337	153329.600	153330.630	1.030	-22.95%	77.049%	95.0-101.0	FAIL
			Average Meter Error			-11.27%		



Remarks:	Approved By:

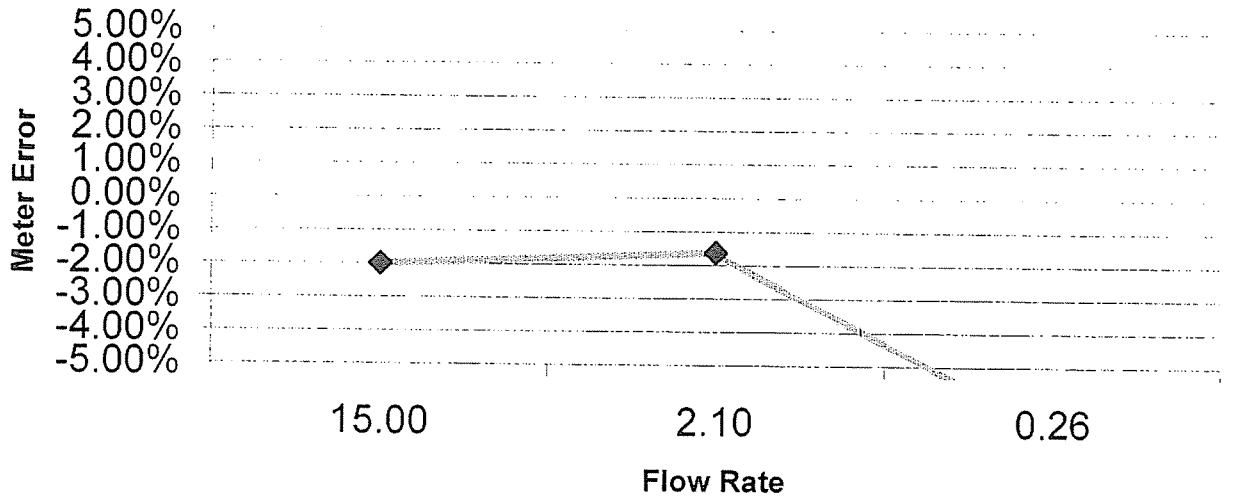
Measurement Control Systems

1331 S. Lyon Street
Santa Ana, California 92705
714 835-0995 800-826-1682
Fax 714 835-1103
www.mcsmeters.com

Meter Accuracy Certificate

Customer:	City of Tustin			S/N -	36171063
Location				Date	10/10/06
Meter Size	Neptune, 5/8x3/4"			Job No.	83318
Type	T-10		Totalizer Reading	RGA No.	214324
Register	Cubic Feet	Test Only	3165 x100 CF	Tested By	RB 00913

GPM Flow Rate	Test Qty	Start Reading	End Reading	Net	Meter Error *percent*	Meter Accuracy *percent*	Accuracy Limits *percent*	Pass or Fail Status
15.00	13.368	316536.500	316549.600	13.100	-2.01%	97.995%	98.5-101.5	FAIL
2.10	1.337	316571.100	316572.415	1.315	-1.63%	98.369%	98.5-101.5	FAIL
0.26	1.377	316580.400	316581.680	1.280	-7.04%	92.962%	95.0-101.0	FAIL
			Average Meter Error			-3.56%		



Remarks:

Approved By: