No More Geysers
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Report on the Water Savings of "No More Geysers" Automatic Shutoff Device

FINAL REPORT, March 2010

Prepared by:

Mr. Emile Monette
Mr. Chris Eader
No More Geysers
www.nomoregeysers.com
info@nomoregeysers.com
830 Orange Avenue, Suite F
Coronado, CA 92118
(619) 522-0743

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Mr. Timothy J. Schaadt
WRM Group, Regional Supply Unit
Metropolitan Water District of Southern California
P.O. Box 54153
Los Angeles, CA 90054-0153

This Final Report is also available at www.nomoregeysers.com.

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NMG greatly appreciates the cooperation and demonstrated dedication to promoting the growth of small businesses, water conservation, and energy efficiency in the landscape irrigation industry exhibited by the participants in the study.

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I. EXECUTIVE SUMMARY

This report documents an automatic shutoff sprinkler riser field-monitoring project conducted in the landscaped areas surrounding an office building parking complex in Oceanside, California. The project was implemented under a contract between the Metropolitan Water District of Southern California and Slingshot LLC. The project was carried out by No More Geysers LLC[1] with support from the property owner and the property management company.

The No More Geysers automatic shutoff device conserved a total of 21,280 gallons of water and stopped water flowing from eleven broken sprinkler risers during the course of the project. This equates to nearly thirty-nine percent of the water used at the site during the period. A total of twenty-four risers broke during the course of the project, eleven of them had No More Geysers valves installed and thirteen did not. Based on the differences in the rates of water usage, the project managers estimate the broken risers in the irrigation zones without No More Geysers valves installed went undiscovered for between three and eighteen days.

II. INTRODUCTION

This report documents an automatic shutoff sprinkler riser field-monitoring project conducted in the landscaped areas surrounding an office building complex in Oceanside, California. The project was implemented under a contract with the Metropolitan Water District of Southern California and carried out by No More Geysers LLC with support from the property owner and the property management company.

a. Background

Water is vital to the survival of everything on the planet and is limited in supply. The Earth is made up of more than 70 percent water, but less than 1 percent of that water is available for human use. The rest is either salt water found in oceans, fresh water frozen in the polar ice caps, or too inaccessible for use. While the population and the demand on freshwater resources are increasing, supply remains constant.

i. The Necessity of Water Conservation

Managing water is a growing concern in the United States. Communities across the country are starting to face challenges regarding water supply and water infrastructure. According to a recent statement by the U.S. Environmental Protection Agency, improving water conservation is one of the most effective ways that communities can manage their water and energy supplies. With less water moving through the system, utility operating costs will decrease. Communities will then avoid costs for treatment chemicals, residuals disposal, and energy associated with water collection, treatment, and disposal. In addition, water conservation can help utilities better manage capacity expansion because necessary expansions can be delayed or reduced in size.

[1] No More Geysers LLC is a partial successor in interest to Slingshot LLC. No More Geysers LLC is assisting Slingshot LLC in wrapping up business before Slingshot is dissolved. For purposes of this Final Report, the company names are used interchangeably.

Communities should work towards integrating low impact development practices and water conservation into existing development and new construction to prevent problems in the future. These approaches are less energy intensive than traditional development and can even help to reduce a community's carbon footprint.

Water conservation is an imperative part of our nation's sustainability efforts and can have a very real impact on reducing water use. But, water conservation doesn't only result in water savings. Delivering water to homes requires a great deal of energy. Approximately 4 percent of the nation's electricity consumption is used moving or treating water and wastewater, and 18 percent of energy use in California is devoted to conveyance of water. Making water distribution more efficient will not only save water and reduce costs, but it will save energy and significantly improve sustainability and increase capital available for infrastructure investment.

ii. Outdoor Water Use

About 30 percent of the water used by the average American household is devoted to outdoor water use. In more arid parts of the country like Southern California, homeowners use as much as 70 percent of their water outdoors. Experts estimate that up to 50 percent of landscape water use goes to waste due to evaporation, wind, or runoff caused by overwatering or broken irrigation systems. In addition to overextending the water supply, landscape irrigation runoff can convey chemical and microbial contaminants into the aquatic environment such as fertilizers, herbicides, salts, and pathogens (increasing non-point source pollution), it can cause significant damage to public and private property, and as a result, it can be a source of liability for the owner of the system from which it flowed.

On any given day, in virtually every neighborhood in California (and many other places on the earth), broken sprinkler risers are literally pouring thousands of gallons of water down storm drains. This water unnecessarily burdens water treatment and reclamation systems and increases the amount of energy required to operate those systems. Commercial and residential outdoor water use in the United States accounts for more than seven billion gallons of water each day, mainly for landscape irrigation. It is certain that a significant portion of this water is lost through broken sprinkler risers. Abating this loss of water will help conserve water and will also reduce energy consumption.

The results of this project demonstrate that No More Geysers conserves a significant amount of water and provides a water and energy conservation measure that can be implemented now.

b. Project Objective

The objective of this demonstration project was to provide measured water savings data from a typical installation of No More Geysers (NMG) automatic shut-off riser and valves.

c. Project Activities and Method

The project activities consisted of identifying and selecting the demonstration site through the site owner, surveying and cataloging the site's irrigation layout, identifying the test and control group irrigation zones, installing the equipment and measuring the water use over the course of twelve months. The water usage at the demonstration site was measured using in-line

water meters installed on individual irrigation zones, one group of zones with NMG installed and the other without.

The project was carried out by installation of the NMG valve on eighty-five (85) existing sprinkler heads in the landscaped area surrounding the parking lots of an office complex in Oceanside, CA, and then monitoring water usage at the site where the NMG valves are installed for a period of twelve months. Water savings was measured by comparison of water usage at the zones where the NMG valves were installed and water usage at the analogous (control) zones where no NMG valves were installed. Usage rates were calculated by the use of in-line water meters isolated on each zone in the landscape irrigation system. Table 1 below shows the number of sprinkler heads in each zone.

TABLE 1	**Zone No.**	**Number of heads**
NMG	10	15
	8	35
	4	11
	9	24
Total:		85
Control	11	10
	5	30
	19	15
	20	15
	16	15
Total:		85

The first phase of the project included a survey of the demonstration site to match up analogous irrigation sprinkler heads and zones. This phase of the project began immediately after the site was identified. After the analogous heads and zones were identified, the individual sprinkler heads at the each zone were fitted with an NMG valve.

Each irrigation zone with NMG valves installed was fitted with an in-line gallon-per-minute water meter to capture accurate data about water use in that system. The analogous zone was also fitted with an in-line water meter to capture data on water usage there. As sprinkler head breaks were discovered, each break was documented and a replacement NMG riser and pin was installed on to the existing NMG valve. The monitoring and measurement of water use were continued for a period of twelve months.

The project managers identified and selected the demonstration site as one where riser breaks occur often and the impact of those breaks was acutely experienced by the property owner. Heads were chosen for installation of a NMG valve because of a location with a historically high breakage rate, a location that makes the head more susceptible to breakage, a location where the risk of property damage from erosion in the case of a break is high, or a location where the risk of storm drain contamination from excessive runoff is high. Also considered were reports from the property manager that in the years prior to the start of the demonstration project, the property owner experienced multiple riser breaks where the runoff

was significant enough to cause damage to the real property that far exceeded the cost of replacing the broken risers.

d. Project Challenges

Initially, the project managers identified a demonstration site at a Sweetwater High School District school in southern San Diego County, but subsequent to contract award by MWD, the site owner backed out on its willingness to provide a site for the project. As a result, the project managers were forced to spend an unforeseen amount of time, resources and energy identifying and selecting an alternative location. The project managers experienced significant reluctance to participate in the demonstration project from managers and owners of suitable locations, which caused the site selection process to take a very long time. The project managers found, by conducting interviews with the owners of potential locations, that often the reluctance to participate was driven by the response the owners received from their landscape managers. When the owner asked the landscaper about the NMG product, it was unrecognized by the landscaper and perceived as something that might create problems in the irrigation system. While awareness of the problem the NMG solves was universal among landscapers and property owners, finding a property owner willing to test the product proved more difficult than expected.

Another challenge the project managers experienced was that property owners have no baseline of their outdoor water use and thus no context by which to judge water savings generated by the NMG. This challenge is caused by the fact that landscape irrigation systems are most often not separately metered (there was not a single location identified during the site choice process which was separately metered).

II. SETUP AND INSTRUMENTATION

A total of nine (9) water meters were used in the project, each installed downstream from the sprinkler valves and timer and upstream from the first sprinkler head in the zone. Eighty-five NMG devices were installed in the project in four irrigation zones. Five control zones, with a total of eighty-five sprinkler heads, had water meters installed. The water meters and NMG valves were installed using industry standard practices. It is unknown whether the irrigation system at the demonstration site is installed in accordance with any widely accepted landscape industry standard. The site was checked for broken risers and meter readings were conducted at least every two weeks and raw data was reported to MWD in project updates. The quarterly reports submitted to MWD are attached to this final report at Appendix B.

The irrigation zones were selected as a test or control respectively based on the number and type of spray nozzles contained in each zone. Consideration was given to spray nozzle location relative to walkways, curbs and higher traffic areas where breakage is most common, and to ensure the control and test zones were as closely analogous as possible.

III. FIELD SITE DESCRIPTION

The demonstration site is an approximately 75,000 square foot parking lot adjacent to a mid-rise office building located in Oceanside, CA.[2] The irrigation zones where the demonstration was conducted are located in the perimeter and the landscaped medians of the parking lot.

IV. RESULTS AND DISCUSSION

The irrigation zones with No More Geysers installed used 21,280 fewer gallons of water during the test period. In the zones with NMG installed, 33,780 gallons of water was consumed by the irrigation system. In the control zones, 55,060 gallons was consumed. This equates to nearly a thirty-nine percent (39%) conservation rate over the entire project. At times during the test period, the savings rate was as high as fifty-one percent (51%) and as low as eleven percent (11%).[3] Even if savings rates only occurred at the lowest rate recorded during this project, the product would be a cost effective way to significantly reduce outdoor water use.

The overall incidence of riser breakage was not as high as the program managers expected, but the incidence of breakage between the test and control sites was almost equal (11 and 13 respectively). The similarity in frequency of breakage allows for a meaningful comparison between the test and control zones and a conclusion that the demonstration project was successful. However, the project managers recognize the benefits testing on a larger scale would present.

Table 2 shows the incidence of breakage by month. As expected, higher breakage rates occurred during summer months when the businesses in the buildings experienced the greatest volume of customers.

[2] The property, known as the Tri-City Corporate Towers, located at 3156 Vista Way, Oceanside, CA 92054, houses mixed-use office space, and has a very high volume of traffic in the parking lot and into and out of the buildings.
[3] See e.g., Appendix B, Report for the month of October 2009.

TABLE 2	Zone No.	Date breaks discovered and repaired (2009)											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
NMG	10												
	8			31	17		16	21	14	18			
	4					22							
	9						16	10, 21		18			
Totals:		0	0	1	1	1	2	3	1	2	0	0	0
Control	11							7	7				
	5					12	16	7	11, 28	18	9	20	
	19												
	20							24					
	16					19		24					
Totals:		0	0	0	0	2	1	4	3	1	1	1	0

Table 3 shows the estimated water loss per zone based on (1) the number of risers broken in that zone during the test period, (2) laboratory test water loss rates where NMG is not installed,[4] (3) an estimated average time of two weeks between actual break and discovery of the break, and (4) the frequency of the irrigation cycle being four times a week for twenty minutes a cycle.

For example, zone 20 experienced one break during the test period. NMG saves 10 gallons per minute,[5] the system cycled 8 times in the two weeks before the break was discovered for 160 minutes of run time, resulting in just over 1600 gallons being wasted through the one broken riser.

[4] Independent laboratory test report on NMG, attached hereto at Appendix C.
[5] Id.

TABLE 3	Zone No.	Number of heads	Riser Breaks	Estimated Gallons[6] Saved
NMG	10	15	--	0
	8	35	6	9816
	4	11	1	1636
	9	24	4	6544
Total:		85	11	17996
				Estimated Gallons Wasted
Control	11	10	2	3272
	5	30	8	13088
	19	15	--	0
	20	15	1	1636
	16	15	2	3272
Total:		85	13	21280

No major instances of erosion or other water damage due to sprinkler head breakage occurred as a result of breaks in the control zone. Some topsoil erosion was experienced in zone 5 due to the frequent breaks.

V. CONCLUSION

The results of this project show that No More Geysers is a viable water conservation product and solution to the problem of broken sprinkler risers. The project also demonstrates that a small number of breaks in a landscape irrigation system can result in significant water loss, which makes the case for widespread use of NMG even more compelling. As government entities and consumers seek ways to conserve water, the NMG should be a recommended product. In addition, the product mitigates erosion, silting and sedimentation of storm drains, and non-point source pollution.

[6] It is impossible to know how long each broken sprinkler head went undiscovered during the monitoring period. The estimates provided are based on the meter readings, the landscaping contractor's maintenance schedule, water pressure at the site, and the setting of the automatic sprinkler system.