

"Federation Corner" column

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WSSC left behind by the response of others to the PCCP Crisis

by Wayne Goldstein

Based on studies, news accounts, and water utility web sites, I have learned that two water utilities stand out in their response to the Prestressed Concrete Cylinder Pipes (PCCP) crisis - the Howard County Bureau of Utilities and the San Diego County Water Authority (SDCWA) - as compared to WSSC. Howard County and WSSC simultaneously experienced PCCP breaks in the '80s and '90s, and even sued the same pipe manufacturer. But the similarity ends there. One of WSSC contractor Pure Technologies research papers, "Acoustic Monitoring of Prestressed Concrete Cylinder Pipe - A Case History," tells what happened:

"In 1995, Howard County's Bureau of Engineering and Utilities developed a plan for inspection of its water mains constructed of PCCP. Beginning in April 2000, an acoustic monitoring program was implemented on approximately 6000 feet of this pipeline. Howard County's Long-Term Plan is to acoustically monitor all the PCCP water mains within the water distribution system. This will provide information regarding the overall condition of the pipes and enable Howard County to determine areas that should be externally inspected or replaced. Acoustic monitoring has allowed pipe evaluation without taking the pipeline out of service and provided data over an extended period of time. Acoustic monitoring has been proven successful in locating failures and Howard County will continue with this program. Acoustic monitoring of 5000 feet of 30-inch PCCP water main in US Route 40 from St. Johns Lane to Dogwood Drive is presently being conducted."

In its 1999 Annual Report, SDCWA stated: "In the early '80s, the Water Authority began experiencing failures in portions of its older, prestressed concrete pipeline. These pipes were constructed as far back as the late 1950s. How the Water Authority responded to these failures represented a significant change in the way the Water Authority inspects and maintains its aqueduct system. In January 1992, the board approved the Aqueduct Protection Program, an inspection, preventative maintenance and repair program that has won accolades from across the U.S. Since 1992, the Water Authority has spent more than \$6 million for the inspection and repair work that prevents pipeline failures and unplanned service interruptions. The greatest testament of the Aqueduct Protection Program's value is its track record: since the program's inception, no section of inspected pipe has failed."

At a November 2000 meeting, SDCWA voted to "...Award a Professional Services Agreement to Pressure Pipe Inspection Company for \$140,000 to Provide Remote Field Eddy Current/Transformer Coupling Inspection Services for Pre-stressed Concrete Cylinder Pipe for the Fiscal Year 2000/2001 Aqueduct Protection Program Shutdowns." In a 12/22/08 press release, Pure Technologies announced that it: "has been awarded a contract for up to [\$3] million by (SDCWA). The SDCWA contract is for the supply and installation of Pure's patented SoundPrint® AFO fibre-optic acoustic monitoring system as part of the Water Authority's Aqueduct Protection Program, and monitoring services for the installation until September 2011. This is the third such contract awarded by the Water Authority to Pure since November 2005. Upon completion of the installation, which is scheduled for January and February 2009, Pure will be monitoring a total of 48 miles of the Authority's aqueduct system."

Pure Technologies also reported in one of its papers: "Approximately 82 miles of [SDCWA] pipelines are prestressed concrete cylinder pipes (PCCP). Made from a combination of steel and concrete, PCCP appeared highly resistant to corrosion and to provide unparalleled inner pipe strength. However, numerous catastrophic failures have occurred with these pipes worldwide. In response, the Water Authority in 1991 instituted a proactive 30-year program to reinforce the pipes with steel liners. To date, the Water Authority has relined more than 24 miles of its pipelines. The remaining 58 miles of PCCP are targeted for rehabilitation by 2027, helping ensure a safe and reliable water supply to the region."

What these documents show is that these two water utilities developed a comprehensive approach to PCCP in the early to mid '90s and embraced monitoring technology in 2000 almost as soon as it became commercially available. These programs have never been shut down. Howard County inspects PCCP pipes down to 30 inches. In contrast, last November, there was this news account: "Although the fiber-optic system, which uses computers to monitor when wires inside pipes break, would not have applied to the [48-inch] Derwood pipe, the system would be beneficial for monitoring large pipes close to residential areas, WSSC officials said."

WSSC, in a briefing to the full County Council earlier this week, stated that it began inspections in 1981 when it: "first used Visual and Sounding to identify deteriorated areas and delaminations." This detailed briefing bore little resemblance to the minimal information provided to a Council committee last year about the Derwood break. This week, I also learned that WSSC may have been more proactive in PCCP inspections and repairs and replacements than the public record appeared to show, making use of Sonic/Ultrasonic Pulse Echo to identify micro-cracking in the mid-1990s and using electromagnetic testing in 2001. WSSC may even have begun a comprehensive physical inspection program of its larger PCCP ahead of both Howard County and SDCWA. WSSC used steel in 1997-98 to line about four miles of its largest, 96-inch PCCP, similar to SDCWA's chosen solution for all of its PCCP. Another four miles of PCCP in various large diameters was replaced in 1989 and in 1997.

Despite such responsible behavior, WSSC allowed long periods between visual inspections. According to the just-released records, there were eight years where little if any PCCP were inspected: 1982, 1983, 1992, 1993, 2001, 2003, 2004, 2005. There were also seven years where more than 7 miles - 37,000 feet - of PCCP were inspected annually: 1988, 1996, 1997, 1998, 1999, 2007, and 2008. There have been three cycles of years of little inspection followed by years of much inspection since 1981.

While various forms of *non-destructive testing* (NDT) first began with inspections in 1997, it does not appear to have been routinely used after that. This record also shows that WSSC still waited seven years longer than Howard County and SDCWA to make use of electronic inspection. While it did first use electronic inspection in 2001, it inspected less than two miles of PCCP that year and didn't use it again until 2007. WSSC also failed to either inspect or monitor PCCP in diameters below 54 inches even though the smaller diameter PCCP is inspected and monitored by the other water utilities. To its credit, I found a few comments like this: "The sonic/ultrasonic nondestructive testing of the WSSC 96" pipe demonstrated much more good pipe exists than had been anticipated; this saved tens of millions of repair dollars." Pure Technologies also praises WSSC's approach to repairing PCCP where warranted, rather than doing indiscriminate relining or replacement regardless of remaining useful life.

In physically and electronically inspecting 4.7 miles - 24,816 feet - or 1551 sixteen-foot PCCP sections in the fall-winter of 2006-07, WSSC replaced 13 failure-prone sections, less than 1% of the total PCCP. In inspecting 5.8 miles - 30,624 feet - or 1914 sixteen-foot PCCP sections in the spring of 2007, WSSC replaced 2 and repaired 7 failure-prone sections, less than 1/2 of 1%. Internal acoustic fiber optic monitoring cable was also installed for all 10.5 miles. WSSC told the council this week that it costs \$250,000 per mile to physically inspect PCCP and then set up the continuous electronic monitoring. It wants to do only twelve miles per year for just \$3 million, claiming it doesn't believe it could get more than that. WSSC also stated that it could do as much as 18 miles per year without disrupting water usage. Does anyone believe that either county would refuse to authorize an additional \$1.5 million per year to inspect and install monitoring equipment in an additional six miles of PCCP to perhaps prevent the equivalent of another River Road break?

WSSC has been guilty of too little, too late over the last 28 years in doing regular inspections. It continues to rely on past assumptions about PCCP size and age, which have been shown to be incorrect, in order to save relatively small sums on inspection costs. It then is forced to waste money when PCCP fails. The \$500,000 cost to WSSC for the 255 million gallons of water lost in the Derwood and River Road pipe breaks alone could have

instead paid to inspect and to install continuous monitoring equipment in two miles of PCCP. Until this week, WSSC appears to have almost concealed what it has done right over the years, a far cry from agencies like MCPS that often take credit where little is due.

While WSSC is now far more straightforward than it was just a few months ago in the aftermath of the Derwood pipe break, I believe that the governments and ratepayers of both counties should exercise greater oversight of all of its operating and CIP budget requests to help WSSC maintain its newfound virtue. This means asking questions to get specific information about the sizes and ages of all broken water pipes, PCCP or not, and the ages and break history of all water pipes proposed for replacement. We need this factual information to decide for ourselves how much WSSC really needs for future infrastructure repair and replacement.

Whatever we decide, we can't punish lower income residents in both counties, in good times or bad, with flat fees for billing or infrastructure instead of instituting aggressively progressive rates that can also motivate greater water conservation efforts. We need to continuously monitor WSSC for potential catastrophic failure as much as we need to demand that WSSC continuously monitor all of its PCCP for potential catastrophic failure.

The views expressed in this column do not necessarily reflect formal positions adopted by the Federation. To submit an 800-1000 word column for consideration, send as an email attachment to waynemgoldstein@hotmail.com