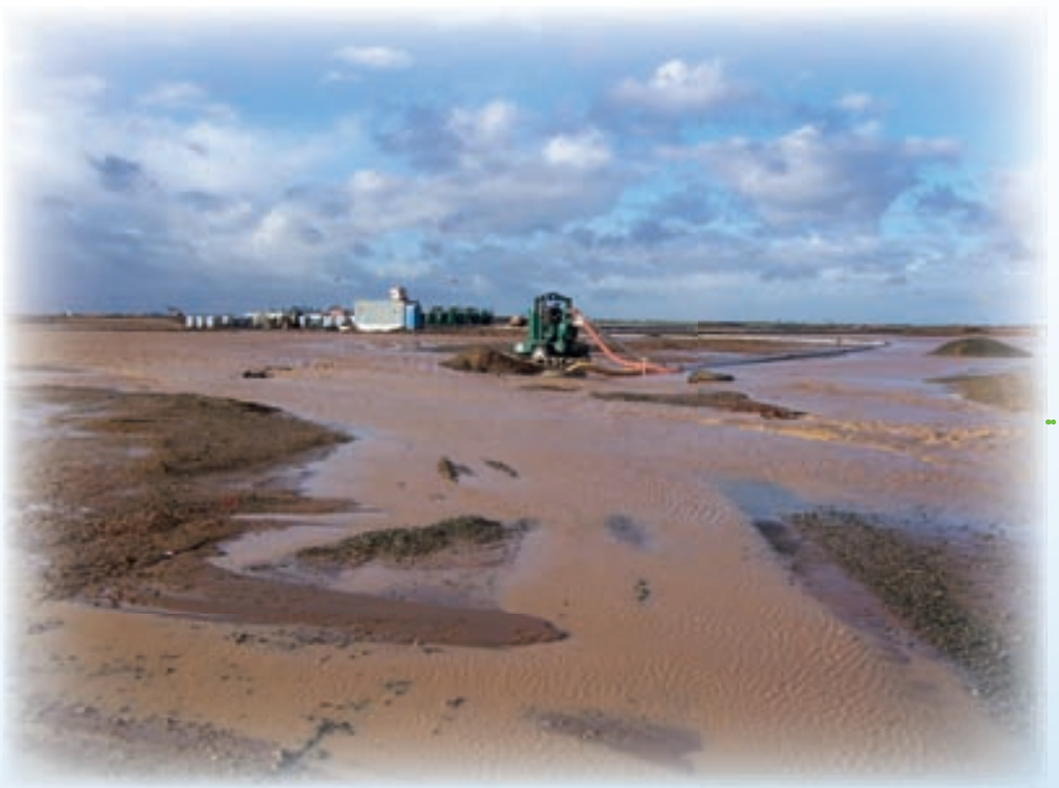
Autopsy of a Preventable Failure

Redesigning a California construction site—and its bidding process—to meet national runoff standards

By Joe Gannon



City, county and state regulatory agencies all over the country have initiated monitoring programs in order to prevent surface water pollution of rivers, lakes and streams from construction site runoff, particularly sediment-laden rainwater. Companies like Clear Creek Systems Inc. (CCSI) have developed specialized equipment and application technology to assist construction companies in properly retaining, processing, filtering and discharging storm water accumulations from their sites.

Near the end of a major December 2005 storm event in Roseville, Calif., a construction site manager paid a visit to a CCSI job trailer. His treatment system was proving to be incapable of clarifying and discharging storm water within prescribed National Pollutant Discharge Elimination System (NPDES) standards.

The runoff from his site was polluting a tributary system that fed the Sacramento River, and state authorities were threatening criminal charges if these adverse conditions were not corrected immediately. The purpose of his visit was to ask, "Can you help me fix this?" The next morning, CCSI was on site with the contractor to begin developing a new plan for the 400-acre area.

Initiating the Redesign

First, site configuration was examined in detail to determine what alterations could be implemented to allow the current system installation to perform well. The situation with state authorities required an immediate response from the site, so CCSI was asked to

A new treatment system kept this site NPDES compliant.

do whatever was necessary to prevent additional noncompliant storm water discharge from leaving the site.

The original installation company had employed 20,000-gal storage tanks instead of settling ponds; these tanks were eliminated from the system because they severely limited its throughput capability. The system piping on the three retention ponds was modified to convert the two smaller ponds into settling basins and the largest to a retention pond.

By altering the field pump suction and discharge piping, CCSI was able to more effectively monitor and control the rainwater falling across the entire site. And in addition to the five previously installed transfer pumps, a new pump was strategically placed on the site to improve storm water consolidation and reduce the risk of uncontrolled sediment-laden runoff.

Addressing Filtration

Next, crews discovered that the sand filters on site were of insufficient size and quantity to process the 2,400 gal per minute (gpm) flow rate called for by the site's Storm Water Pollution Prevention Plan (SWPPP). Amendments were completed to the current system to provide the site with a functional Advanced Treatment System (ATS) using FlocClear biopolymer, or chitosan.

The modifications made to the onsite equipment allowed for the discharge of 1,300 gpm of filtered storm water that same day, exceeding the requirements of the site's NPDES permit. Site dewatering continued around the clock at 1,300 gpm for four days while the equipment for a 2,400-gpm system originally quoted for the site was shipped in and installed.

The system now had the capability to better control the water flow and flocculent injection rates entering the treatment ponds. Also, CCSI continued the application of FlocClear biopolymer as the chemical flocculent for the new treatment stream. Flocculent injection was metered into a storm water transfer line, which moved storm water from the retention basin to the two smaller settling basins.

The purpose of the settling basins is twofold. Once FlocClear is injected into the sediment-laden water, the suspended dirt and clay particles are agglomerated into a large, heavy flock. The settling basins provide the retention time needed for the flock to settle out to the bottom of the treatment pond. With the flock settled out of the water, the water can then be pumped into the filtration system.

The size of the settling basins was engineered to allow ample residence and settling time for continuous flow-through operations. The resulting clarified water from the settling basins was then pumped through multistaged sand and particulate filters, ultimately discharging into the Sacramento River. During subsequent storm events, and often for days after a storm event, the system was operating at full capacity 24 hours a day.

Meeting Standards

With the new flow-through treatment configuration, field alterations, increased settling time and proper application of the chitosan-enhanced filtration system, the risk of noncompliant discharge into the receiving waters was greatly reduced for both sediment and residual chemical breakthrough. As an added layer of protection against any further excessive discharge violations, crews installed an automatic nephelometric turbidity unit (NTU) control system on the discharge line to the receiving stream.

This system automatically monitored

the discharge NTU levels, and, in the event of an elevated NTU reading, motor-controlled valves activated and diverted the discharge back into the holding pond. With the new system operational, the incoming storm water clarity was reduced from an average of 736 NTU to 2.4 NTU. The site incurred no additional NPDES violations that year, and the contractor avoided any further monetary or criminal penalties.

Lessons Learned

The following year, the construction company required all submitted bids to include flow rate, containment and cost criteria so that all bids being evaluated could be compared on an equal basis. The employment of an environmental service team to verify and confirm the feelings and instincts of the construction site manager also led to more informed vendor selection the following rainy season.

Cost can and should be a major concern when it comes to selecting a storm water treatment company for a construction site. It is a competitive business, and there are numerous companies from which to choose. Reviewing and verifying a vendor's ability to meet requirements must be a priority, and site managers should take a hard look at the track record of each potential vendor.

Though many times it seems that costs can be reduced greatly through a bidding process, the old adage that you get what you pay for definitely applies in this industry. When one takes into consideration the negative impact—both financially and legally—that can result from a site failure in the area of storm water treatment, one point becomes clear—it can significantly benefit planning efforts to pay attention to all aspects of the available vendors, particularly past customer references.

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