Petrol PLAZA

Options for Fixing Leaking Sumps - Part 1: Keeping Water Out and Fuel In

Preventing water from infiltrating secondary containment has proven to be one of our most vexing operational problems. Some take the position that if water can leak in, fuel may leak out. As a result finding and stopping leaks in secondary containment devices have become a major operational problem as piping expert Andy Youngs explains.

If groundwater can get into a sump, then gasoline in the sump can also get out into the environment. Groundwater, which has leaked into a sump, could be contaminated with fuel, and therefore must be treated and disposed of (in most jurisdictions) like hazardous waste. Shutting down a service station when a sump goes into alarm over groundwater intrusion is inconvenient and expensive. Several viable competing technologies are available to fix groundwater intrusion problems with sumps.

Incentive for dry sumps

All of the above are true statements. The author, during over ten years in the petroleum equipment industry, has never had a single person dispute any of the above statements except the last one. And most industry experts agree now that the last statement above has become true over the last few years. The rush to comply with the 1998 EPA deadline is long over, so one would have expected that the next wave of compliance work would be making sure that the secondarily-contained, upgraded systems remained fuel-tight from the inside and water-tight from the outside. Slowly but surely, this is beginning to happen.

New regulations in Florida and California are asserting that a wet sump is a non-compliant sump. In the Midwest, where these types of specific regulations are not in place, regulators are focusing their attention more on in-place systems. Casey Smith of Phoenix Environmental, a Detroit, Michigan area firm, does the lion's share of the Detroit-area county and municipal fuel system work. Casey stated recently "In our area, the bulk of the work has shifted from compliance upgrades to inspections and maintenance of upgraded systems to ensure that they remain in compliance. Even where regulatory pressure doesn't exist, system owners are recognizing the long-term cost-effectiveness of making sure that their sumps stay dry."

New California Rules SB 989, State Water Resources Control Board

A new regulation in California requires that secondary containment system be capable of preventing the inflow of the "highest groundwater anticipated into the interstitial space during the life of the tank. SB 989 also requires that secondary containment systems installed after during or after 2001 must be tested upon installation, six months later, and every 36 months thereafter. Secondary containment systems installed prior to 2001 must be tested by before the end of 2002 and every 36 months thereafter.

By the end of 2002, the owner/operator of any secondary containment system that the owner determines cannot be tested in accordance with this section must be replace a system that can be tested in accordance with this section.

Periodic testing must demonstrate that the system performs at least as well as it did upon installation. For example, if the secondary containment system was tested upon installation by using a test method that applied a pressure of 5 psi, then the periodic test must be conducted using a method that tests the system at an equivalent pressure.

Florida's environmental regulation (62-671) is a little more forgiving of groundwater intrusion. It requires that sumps be designed, constructed and installed to minimize water entering the sump, but does require immediate notification upon presence of water in the sump, whether or not there is a sheen on the surface. Florida regulators have stepped up their efforts to ensure that sump systems are watertight as part of the state's ongoing effort on groundwater remediation and pollution prevention.

Sump Remediation Products and Services

So if there is water in a sump, getting the water out and preventing it from re-entering is becoming a regulatory compliance task, as well as being environmentally friendly and, over the long-term, cost-effective. At this time, there are four major suppliers of sump remediation products and or services:

• Sump Services, Inc. (SSI) of Oroville, CA supplies the Universal In-Service Repair Boot, a split entry boot that can be installed over leaking entry boots, piping or conduit entries. SSI also supplies expanding foam to stop short-term water intrusion for enough time to allow a permanent fix to be installed, and has recently developed solutions for leaking sump seams as well.

• Total Containment, Inc. (TCI) of Oaks, PA supplies the TotalGard system, which includes watertight sump lid closure systems, and the process of installing a fiberglass sump liner inside of the existing sump.

• Unit Liner Company (Unit Liner) of Shawnee, OK supplies a polysulfide sealing system, which is used to build dispenser sumps under dispensers, which do not have sumps, as well as to create a liner in existing sumps.

• Water Block Technologies International, Inc. (Water Block) of Fort Worth, TX supplies a system of an expanding foam placed outside of the sump for stopping water intrusion for a short period, then an epoxy coating which is applied to the inside of the sump to provide a longer-term fix. (Water Block Technologies declined to be interviewed for this article or to send technical information - the information given here is gathered from their website and the author's experience with the product)

Within these four suppliers, two basic philosophies emerge - fix just the particular area that is leaking (SSI, Water Block); or create an entire new containment liner (TCI, Unit Liner). Obviously, the approach utilizing an entire new containment liner is more expensive initially - costs can run several thousand dollars per sump. Proponents of the entire new containment liner approach contend that this is the best way to ensure that not only are the currently leaking components fixed, but that potential leak points are prevented from leaking in the future.

Proponents of the fix only what is leaking philosophy contend that this becomes the most cost effective way to deal with water intrusion into sumps - one can fix only what is currently leaking - but, if desired, one can go ahead and place the permanent water intrusion fix on non-leaking components as a hedge against future leaks.

All four systems have in common that station downtime and disruption is minimal - and if concrete is not cut and lines are not broken, there are usually no permitting costs and hassles to deal with. All four systems have a fair number of major oil customers. The major oil firms have been at the most active in efforts to maintain dry sumps and prevent potentials for environmental damage, and all four of these systems have major oil users and proponents.

Sump Services, Inc.

Russ Perry, Vice-President of Operations for SSI, states that the SSI system provides a quick, relatively inexpensive and permanent solution to leaking entry boots, pipe and conduit entries. "Our experience", states Perry, "is that the overwhelming majority of water intrusion problems in sumps come from leaking entry boots. Most of these boots are made from nitrile rubber, which the Air Force will not allow to be used more than ten years after manufacture - even if its been in a sealed bag on a shelf that whole time. So even if your boots aren't leaking now - they probably will! Fortunately, we have a cost-effective solution for leaking boots."

A split clamshell fittings which surround the existing penetration fitting. Photo courtesy of Sump Services, Inc.

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Completed installation. Photo courtesy of Sump Services, Inc.

SSI's system involves taking a flexible entry boot, which has been split, and placing it over the existing pipe or conduit entry, and over any existing flexible entry boot. There are a large number of sizes available, which can work as packaged or be modified to remediate nearly any flexible entry boot or pipe size placed on the market in the last ten years. After placing the split boot around the pipe, it is bonded together and fastened to the sump wall. A custom pneumatic sealant delivery gun places a moisture-cured sealant at high pressure into the boot, sealing it and any leaks or holes it is covering.

"With the SSI repair boot", states Perry, "you never have to break a product line - there is no

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permitting and the station is never shut down. The average site can be remediate by two workers in a day, at reasonable cost. Our sealant is manufactured to stringent Federal standards, and is water, fuel and alcohol resistant. SSI keeps your costs low by allowing you to fix just what is leaking - although placing repair boots over all boots in a sump once you are in there can sure be cheap insurance."

Total Containment, Inc.

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Tony Adamson, Vice-President of Marketing for TCI, states that, although they often do a total sump liner retrofit, that TCI's system approach can be customized to the individual situation. "We do what needs to be done", states Adamson, "but you have to make sure that you compare apples to apples. Although leaking bulkheads may constitute a large portion of leaks, we believe that is only one of five main places where water can get into the sump. The TCI system addresses each of those five points."

The TCI system involves replacing leaking bulkheads first - which does require breaking product lines, as does the sump lining process - but in a non-blending location there is normally no downtime and minimal disruption. A sump liner can be installed, and the "top hat" on fiberglass sumps either properly fiberglassed or replaced. One key feature of the system, according to TCI, is the retrofit of a watertight lid closure system onto the sump.

"Unfortunately," says Adamson, "station and maintenance personnel have to remove sump lids frequently, and they are often not reinstalled properly. We set out to develop a watertight sump closure system which would remain watertight after many, many openings and closings." Another key feature of the TCI system, according to Adamson, is that all rubber-based and critical components are placed on the inside of the sump - so they are easily inspected, and replaced if damaged.

But perhaps the most insidious cause of water in the sumps, as pointed out by Adamson, is water coming into the sumps through the electrical conduit. Conduit is not watertight, so high groundwater results in water entering the sump via the conduit itself. Sealants applied to the inside of the conduit to form a plug against water intrusion are specified by several of the major oils. TCI will soon announce what it feels is an even better fix for existing locations.

Unit Liner Company

Steve Benfield, National Sales Manager for Unit Liner, states that one of the major advantages of his firm's system is its inherent flexibility. "Most water leaks", states Benfield, regardless of what components they come through, have in common that they were caused to some degree by ground movement. Our system is very flexible, and can take a great deal of ground movement without compromising the integrity of the containment."

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Beginning phase of lining a sump with a flexible polysulphide elastomer. Photo courtesy of Unit Liner, Inc.

The Unit liner Company system involves placing a polysulfide liner over the entire interior of a tank

sump. In a dispenser sump, the liner is placed only 6-8 inches deep and effectively forms a dispenser pan. The liner polymer is highly resistant to fuels, water alcohols and MTBE, according to Benfield. "Our material bonds very well to fiberglass", he states, "but bonding to polyethylene has always proven difficult. We have developed a special material which is applied to polyethylene as a double faced tape, which will bond to both the polyethylene sump and any fiberglass or polysulfide we place over it."

Completed flexible sump liner. Photo courtesy of Unit Liner, Inc.

This system is installed without breaking lines, and normally requires no permitting, and little to no downtime, according to the manufacturer.

Water Block Technologies

Perhaps the first firm to try to address water intrusion in sumps in any manner other than replacing the sump and/or entry boots, Water Block Technologies provides an inexpensive, short-term solution to water intrusion. An advantage of this system is that it can be utilized for almost any type of problem - leaking seams, a vertical crack in the sump wall, etc. And with no product lines broken, it can be utilized with no shutdown or permitting, in most instances.

The Water Block system consists of expanding polyurethane foam, which is injected outside of the sump. This foam material expands during cure and reduces or eliminates water pressure for long enough for the application of a two-part moisture-insensitive epoxy resin system to the interior of the sump. This system is relatively inexpensive, and works best on fiberglass sumps to which the epoxy coating can adhere. The expanding foam portion of the system can be supplied with or without accelerator to provide improved installation properties depending on the particular situation.

Several piping and sump system manufacturers offer systems similar to those marketed by Water Block. There are several other approaches to making repairs that I will discuss in a future article. I will also discuss methods of testing sumps to determine if they leak.

OK, Professor, So Which One Do I Use?

Although the author has worked with or seen in place all of the systems described here, stating that one or the other is the best is just not possible. Each site will have a unique combination of groundwater conditions, equipment installation differences, regulatory environment, and last but not least economic concerns. Each of the four systems presented have significant advantages in certain situations.

One of the main goals of this first article of two articles was to ensure that we all understand that a wet sump is a potentially polluting sump and that there are several viable technologies available for remediation wet sumps, some of which are not included in this article. System owners are encouraged to give alternatives a try, find out which one works best for them, and then **keep your sumps dry!**

But I've got a 30-year warranty!

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In the early 1990's, the fiercely competitive market for equipment led to a warranty escalation in underground piping systems. Manufacturer's warranties grew from one year to thirty years, and in many instances began to include labor costs as well as replacement equipment costs. Some of these warranties even cover water intrusion into sumps. So as a system owner, you pick the best warranty, make sure the company that's backing it is solid, have that system installed and sleep easy at night for the next thirty years. Do you have water in a sump? No problem. Just call 1-800-SUPPLIER and they'll deal with it totally.

Well, the reality is not so neat and convenient. A number of owners, distributors and contractors have voiced the same concerns time after time - and not about just one system or manufacturer - this concern goes pretty much across the board. The problem is that the warranties (and rightly so) only cover defects in materials and workmanship of the products. If they are not installed properly, they can't function properly, and therefore there is no warranty. So when there is water in your sump and you call 1-800-SUPPLIER, here's what usually happens, according to these sources:

Supplier representative contacts distributor who sold the job and asks them to go inspect the site. Supplier technical representative may or may not attend this first inspection.

At the site, everyone looks in and agrees - "yup, there sure is water in there", and the questions about installation practice commence. The installation contractor at this point insists that they were certified/trained installers, and they did everything right. Supplier generally asserts that this is the first instance like this they've ever seen, unless the system was poorly installed.

A date is set for supplier technical representative (company employee or authorized contractor) to come inspect the site and try to fix it. Owner and/or installation contractor is responsible for pumping the water out of the sump and disposing of it, as well as providing supplier technical representative with additional labor, tools, etc. which might be needed, and perhaps also pumping down the water table (which, due to the wet sump, the astute local regulator may require this water to al be dealt with as hazardous). So to get to the point at which the problem can be fixed and fault assigned, owner is out several hundred to several thousand dollars.

Problem is generally fixed (the piping/sump system suppliers have become quite good at dealing with commonly encountered problems - they may have to come back one more time to button up a minor leak, but they can usually fix it), utilizing one of the technologies discussed in this article.

Then the wrestling over what caused it ensues. If the supplier asserts that its installation error (it often is, but proving whether its bad product or bad installation is not an easy task for the owner), and the site is more than one year old (most contractor warranties are only one year), then the owner picks up the entire cost of the fix. If the supplier does find it to be a defective product, then supplier picks up the whole tab, including the costs initially borne by the owner for pump-out, etc.

The point of all this is not to be negative about the suppliers - suppliers in this industry have to make good products and stand behind them, or they don't survive. And installation error is not uncommon,

by any means. But owners need to be aware that a thirty year warranty with labor is no substitute for proper installation practice, and that choice of installation contractor, choice of underground system, and choice of method to ensure proper installation are all equally important - you can't ignore or underestimate the importance of any of the three.

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