

PILE DRIVING

COMMON PROBLEMS AND SOLUTIONS

PILEBUCK

THE INTERNATIONAL DEEP FOUNDATIONS
AND MARINE CONSTRUCTION MAGAZINE

PUBLISHED 6 TIMES A YEAR

EST. 1984

JAN/FEB 2021
VOLUME 37, ISSUE 1



GEOTECHNICAL ENGINEERING RISK MANAGEMENT

COMMON RISKS, SCORING, ASSESSMENTS, AND MORE

PLUS

MARINE CONSTRUCTION GUIDE

Part II: Design Concepts & Specifications

CMI

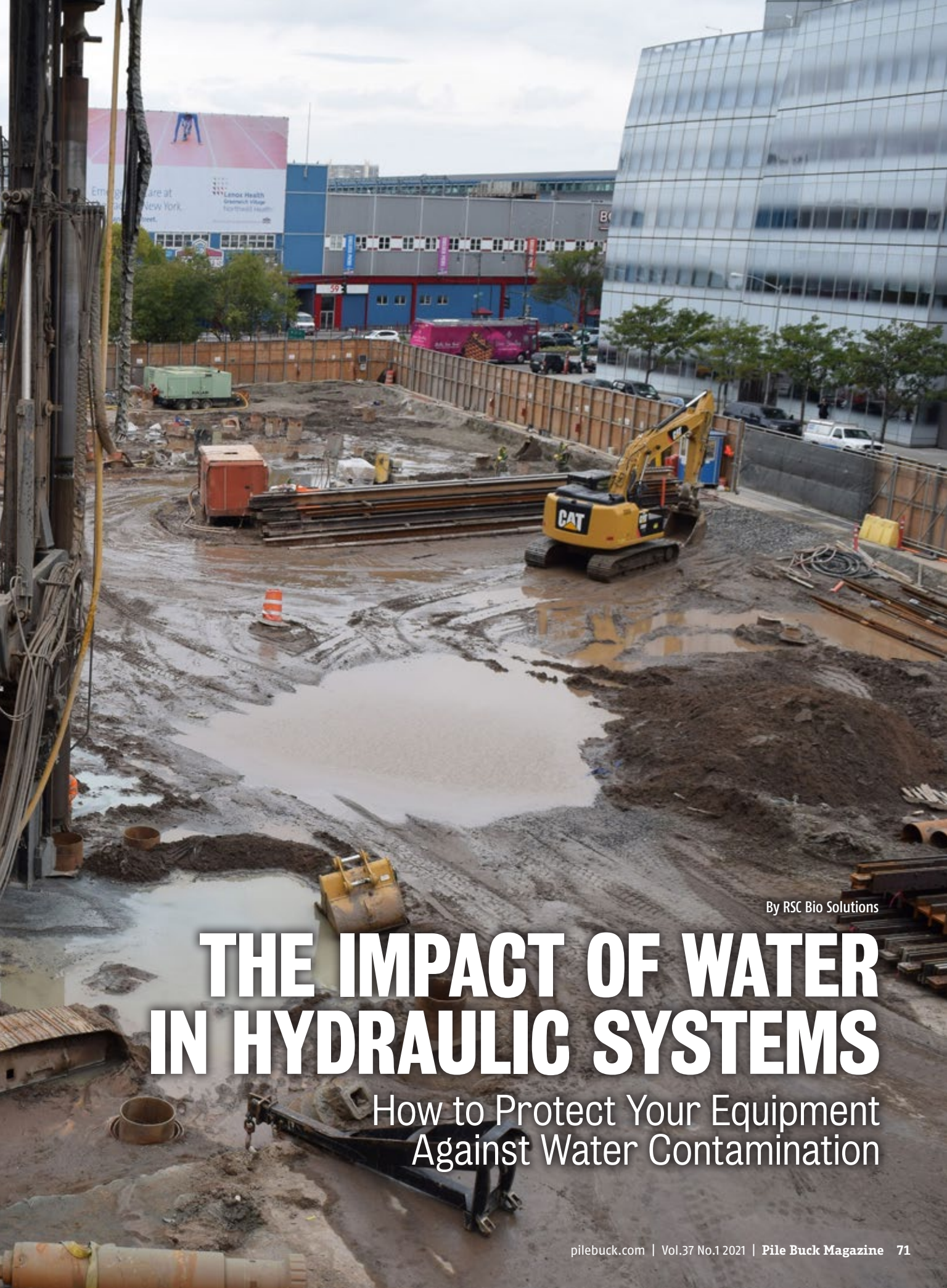
The Pile Buck Interview

3D-ENABLED WORKFLOWS

Heat Up on Utility Scale Solar Developments



New York – October 13, 2016: A construction site on the corner of W 17th Street and 10th Avenue where pile drivers starting the ground works for a building site in wet conditions. Photo credit: Karin Wheeler.



By RSC Bio Solutions

THE IMPACT OF WATER IN HYDRAULIC SYSTEMS

How to Protect Your Equipment
Against Water Contamination



Even the smallest hydraulic system failure can be very costly in terms of lost productivity, change-out times, and repairs. This is compounded in large-scale operations, such as oil rigs or dredging sites. When a hydraulic system failure occurs, it is commonly blamed on the oil or hydraulic fluid being used, and rightly so, since it is estimated that 90 percent of the time a fluid-related pump failure is due to contamination. However, rather than simply questioning the quality or performance of the fluid itself, it is important to examine how the contamination occurred, what might have been done to prevent it, and how to use the findings to prevent future problems. >>

SOLVE SMARTER

FOR DREDGING + MARINE CONSTRUCTION



A LEADING GREEN TECH COMPANY
LUBRICANTS | OILS | GREASES | CLEANERS

RSC Bio Solutions' products are environmentally acceptable lubricants for demanding dredging and construction equipment where high performance meets environmental responsibility. These solutions offer extreme protection against water and the elements while delivering long term stability, resulting in more uptime and reduced operating costs so you can get the job done. Our exclusive technologies offer the stability, compatibility, and reliability you need, while minimizing exposure concerns. At RSC Bio, we believe it's not enough to simply solve a challenge. You need to solve smarter.



A HISTORY OF
BREAKTHROUGH
TECHNOLOGY



EXTENSIVE
OEM APPROVAL



DROP-IN
COMPATIBILITY



FOR MORE INFORMATION ON OUR BREAKTHROUGH TECHNOLOGIES 800-661-3558 | RSCBIO.COM



According to original equipment manufacturers and tribologists, the number one cause of hydraulic system failure is water contamination. Through a series of chemical reactions, the presence of water in the system creates a corrosive environment, which shortens the life of the pump or other hydraulic system components. While it is impossible to prevent water from getting into your system, there is a series of procedures and protocols that maintenance professionals can implement to measure the amount of water in the system and then work to remove it before a failure occurs.

SOURCES OF WATER CONTAMINATION

Even under the best circumstances and most controlled environments, it is virtually impossible to prevent water from entering a hydraulic system. Water can seep in through external sources including rain or routine washdowns, through cylinders or leaky seals on external reservoirs. Water can also come from internal sources, including condensation and heat exchangers. For example, a system that is run in hot, humid environments takes in air containing water vapor, which condenses as it cools and remains in the hydraulic system.

This water can be present as dissolved, emulsified or free water. The point at which the fluid cannot hold any more dissolved water is called saturation. Hydraulic fluid saturation points vary based on the fluid base oil and the additives used, as well as operating conditions, including pressure and temperature.

PROBLEMS ASSOCIATED WITH WATER CONTAMINATION

One of the tell-tale signs of oversaturated fluid is cloudiness. However, in a closed system, the level of water in the

system can be difficult to view or detect until there are problems.

Long before a failure, the following operational problems begin to occur when the saturation point is reached:

- Surface corrosion.
- Oxidation – Oxygen molecules in the water can begin chemical reactions to oxidize the fluid, reducing the fluid life.
- Reduced viscosity, lubricity, compressibility and load-carrying capability.
- Bearing system damage – Water present in the bearing load can be especially damaging, creating super-heated steam that can cause a mini-explosion within the oil that can damage the fluid and crack bearing surfaces.
- Hydrolysis – Water and heat acting together can also cause the decomposition of ester-based fluids, causing acids to form which wear and corrode system components. Metal can serve as a catalyst for this type of chemical reaction.
- Crystallization – At low temperatures, ice crystals can form, impeding the operation of the system.
- Higher operating temperatures can force the system to work harder and respond more slowly.
- Cavitation – Water can cause vapor pockets to form within the fluid, reducing fluid effectiveness and life.

- Foaming – An excess amount of foaming can result in a slow-responding hydraulic system, as well as cavitation.
- Premature additive depletion or precipitation can reduce the effectiveness of the fluid's performance.
- Sludge formation – Since water is polar, it is likely to bond with other system contaminants, such as soot, resin and dirt. This can create a sludge that could overwhelm strainers and other filtration measures, restricting oil flow in the system.

THE IMPACT OF FLUID CHOICE ON WATER CONTAMINATION

The type of lubricant oil or fluid used can have a major impact on water contamination and removing water from a system. Petrochemical based oils and different classes of environmentally acceptable lubricants (EALs) react differently with water. Unlike petroleum-based oils, which do not mix with water, some EALs, including certain hydraulic environmental synthetic esters (HEES) and polyalkylene glycol synthetics (HEPG) are emulsifying, which means they tend to absorb water. Hydraulic Environmental Polyalphaolefin and other synthetic hydrocarbons (HEPRs), on the other

WATER CAN SEEP IN THROUGH EXTERNAL SOURCES INCLUDING RAIN OR ROUTINE WASHDOWNS, THROUGH CYLINDERS OR LEAKY SEALS ON EXTERNAL RESERVOIRS. WATER CAN ALSO COME FROM INTERNAL SOURCES, INCLUDING CONDENSATION AND HEAT EXCHANGERS.

Experience the Progress.



Liebherr deep foundation machinery

- High availability and long service-life due to robust equipment technology
- Low emission and high efficiency thanks to intelligent drive systems
- Operating comfort through innovative control concept
- Matching working tools ensure excellent productivity
- Optimized construction processes thanks to comprehensive consultation

Liebherr USA Co.
MCCtec Division
Crawler Cranes and Foundation Equipment
7075 Bennington Street, Houston, TX 77028-5812
Tel.: +1 713 636-4000
foundation.equipment.usa@liebherr.com
www.facebook.com/LiebherrConstruction
www.liebherr.com

LIEBHERR

Operators look under the hood for any potential water damage.



46th ANNUAL CONFERENCE ON DEEP FOUNDATIONS



Las Vegas



MGM GRAND

OCTOBER 12-15, 2021

LEARN HOW TO IMPROVE THE ODDS

AGAINST CHALLENGING CONDITIONS

WITH WINNING PRACTICES

AND ACE TECHNOLOGY



www.dfi.org/Annual2021

PROTECTING EQUIPMENT

	TRIGLYCERIDES HETG	GLYCOLS HEPG	ESTERS HEES	FUTERRA™ HEPR	MINERAL
DURABILITY / LIFE EXPECTANCY	●	●	●	●	●
OPERATIONAL TEMPERATURES	●	●	●	●	●
OXIDATIVE STABILITY	●	●	●	●	●
HYDROLYTIC STABILITY	●	●	●	●	●
WATER SEPARABILITY	●	●	●	●	●
SEAL COMPATIBILITY	●	●	●	●	●
FRICTIONAL CHARACTERISTICS	●	●	●	●	●
VISCOSITY INDEX	●	●	●	●	●
MINERAL OIL COMPATIBILITY	●	●	●	●	●
FOAM	●	●	●	●	●

● Excellent ● Good ● Fair ● Poor

hand are demulsifying, which means that they separate water out from the fluid, rather than absorbing it.

Many producers of HEES and HEPG type EALs have claimed that, given their fluids' ability to emulsify water, there is no need to check for or remove water from the system. However, most OEMs disagree, recommending draining and refilling any fluid once water content exceeds five percent (5%). The industry generally appears to be moving toward wider use of demulsifying lubricants, like HEPRs, which allow water to be easily removed through normal separating methods. In field use, HEPR type EALs generally offer longer drain intervals and enhanced performance, which can result in better total cost of ownership.

Following is summary of the different types of oils and key performance ratings:

BEST PRACTICES FOR PREVENTING SYSTEM FAILURES RELATED TO WATER CONTAMINATION

Just as a myriad of factors contribute to the breakdown of some hydraulic oils and fluids, there are many steps that can be taken to prevent failures.

- Check fluid levels at least twice a year.
- Implement an oil analysis program.

It's possible to remove the guesswork by checking fluid levels and instituting a rigorous and regular oil sampling and analysis program,

which can quantify the level of water present in your fluids, as well as key performance indicators, such as: total acid number, viscosity and lubricity. By routinely testing your fluids, you will be armed with the quantifiable information to take action before a failure occurs.

- Establish regular fluid change out intervals. Even the best fluids will break down over time, so use the data gained through your oil analysis to determine the optimum change out interval for your operating needs. While this may appear to be time-consuming or costly, the upside of doing so far outweighs the negative ramifications of a failure. Be sure to change the fluid filter when changing out the oil.
- Don't ignore a perpetual leak — no matter how slow it may seem.
- Follow equipment manufacturers' maintenance and warranty recommendations to the letter — cutting corners will cost you more in the long term.

HELP IS AVAILABLE

Minimizing the risk of failures and maximizing the performance of expensive equipment is a large responsibility; and everyone involved, from senior leadership, to engineers, to maintenance professional and field workers, must share in this responsibility. While this may seem daunting, there is a great deal of information and many resources available to help. OEMs have well established product certifications, protocols and guidelines in place, and many fluid manufacturers can offer insight into choosing the right products for your needs. Some fluid manufacturers, such as RSC Bio Solutions, offer oil sampling and analysis programs to help you get a solid understanding of the state of your fluids, their impact on performance, and what you can do to extend fluid and equipment lifecycles.

For more information, please visit us online at www.rscbio.com or call 1-800-639-8633. ■

MINIMIZING THE RISK OF FAILURES AND MAXIMIZING THE PERFORMANCE OF EXPENSIVE EQUIPMENT IS A LARGE RESPONSIBILITY; AND EVERYONE INVOLVED, FROM SENIOR LEADERSHIP, TO ENGINEERS, TO MAINTENANCE PROFESSIONAL AND FIELD WORKERS, MUST SHARE IN THIS RESPONSIBILITY.