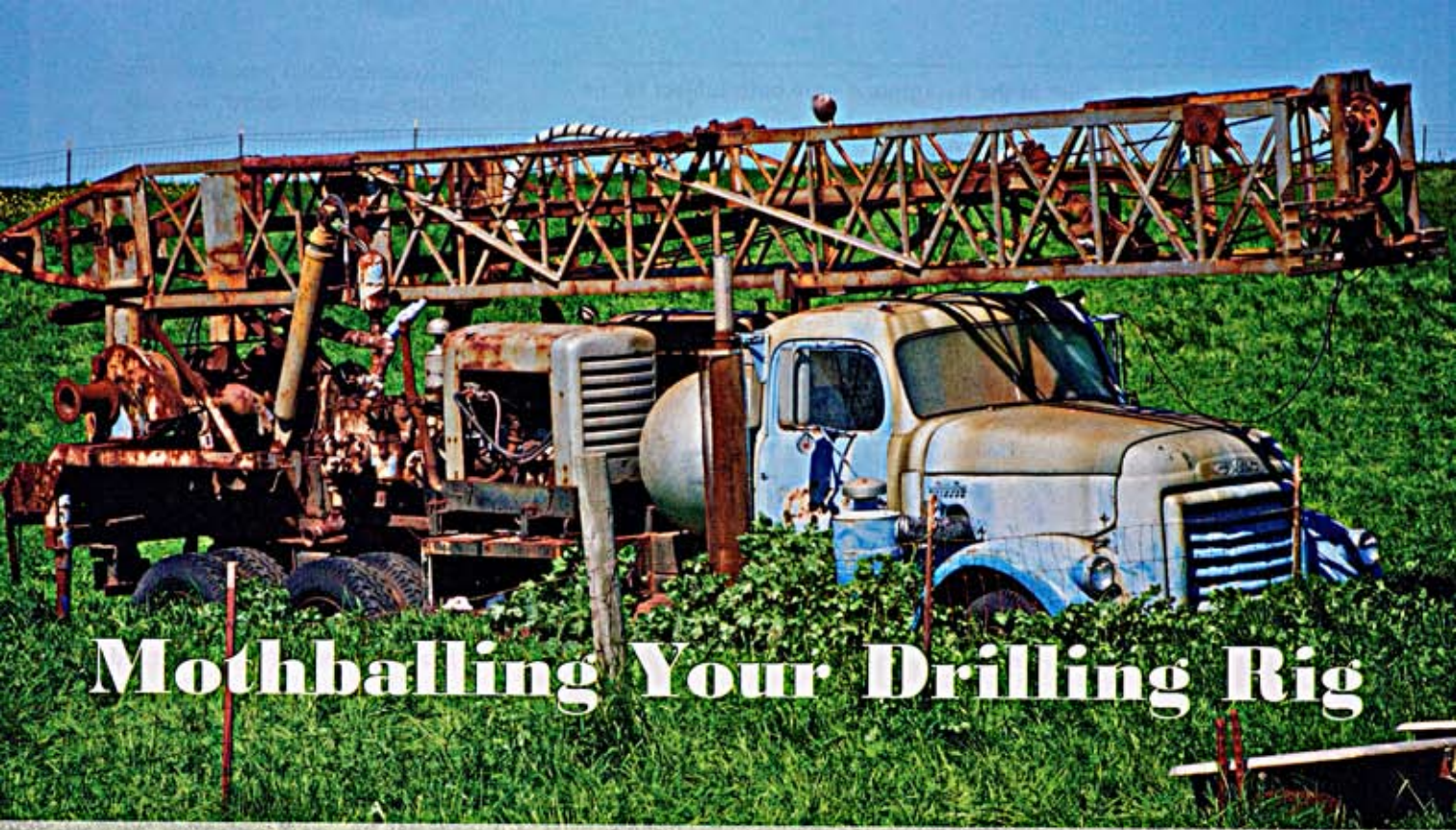

Mothballing Your Drilling Rig

Got a drilling rig that's not seeing much action? Take the necessary steps to protect it now so it's ready for the future.

By Jill Ross

It's a scenario most contractors don't want to think about. A big, expensive piece of equipment, such as a water well drilling rig, sitting idle.

But if this is indeed reality, it doesn't make sense to just let it molder until your circumstances change. A little advance planning goes a long way to protecting your investment and ensuring your equipment is ready to go whenever you are.

What's Mothballing?

The reasons why a drilling rig may be sitting idle are plentiful and varied. Perhaps the contractor has seen a slowdown in work. The rig is waiting at a construction site in the middle of a lengthy project. The rig is for sale but not yet sold. The rig is no longer used and being saved for parts. The rig could even be on a long journey, perhaps being shipped overseas to new owners.

"Unfortunately, (the need to store rigs) seems to be happening quite often right now," says Bob Edwards, the vice president of development at Schramm Inc., a manufacturer of drilling rigs in West Chester, Pennsylvania. "It's a common happening every 10 years or so."

Whatever the reason, it's important to prepare the rig for long periods of storage, also known as "mothballing."

Most ground water contractors recognize the importance of routine maintenance for their expensive equipment fleets. However, many can risk serious damage to that same equipment when they fail to take the appropriate steps to mothball the equipment when preparing for temporary shutdowns. Equipment that is not properly stored will quickly show signs of internal corrosion and cause start-up problems when the equipment is brought back into service.

Following, we'll take a look at some of the recommended steps to mothball drilling rigs and their related equipment.

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What Next?

Ironically enough, the biggest threat to inactive water well drilling rigs is, well . . . water. Water is vital to life, health, and happiness but can mean an untimely death to idle industrial machines.

Steps for lubricating and sealing openings to guard against moisture and other contaminants are essential. Means of preventing corrosion can include films, grease, hard coatings, fluids, powders, foams, wax, desiccants (moisture absorbents), or even wraps and plastic coatings (Table 1).

But, first things first. Think about where the rig will be stored.

"When a drill is not to be used for a period of time, it should be placed in a dry protected place if possible," says Craig Bymaster, director of engineering at George E. Failing Co. (GEFCO), a manufacturer of drilling rigs in Enid, Oklahoma.

Alternatives may include covering with a tarpaulin, preferably held in place

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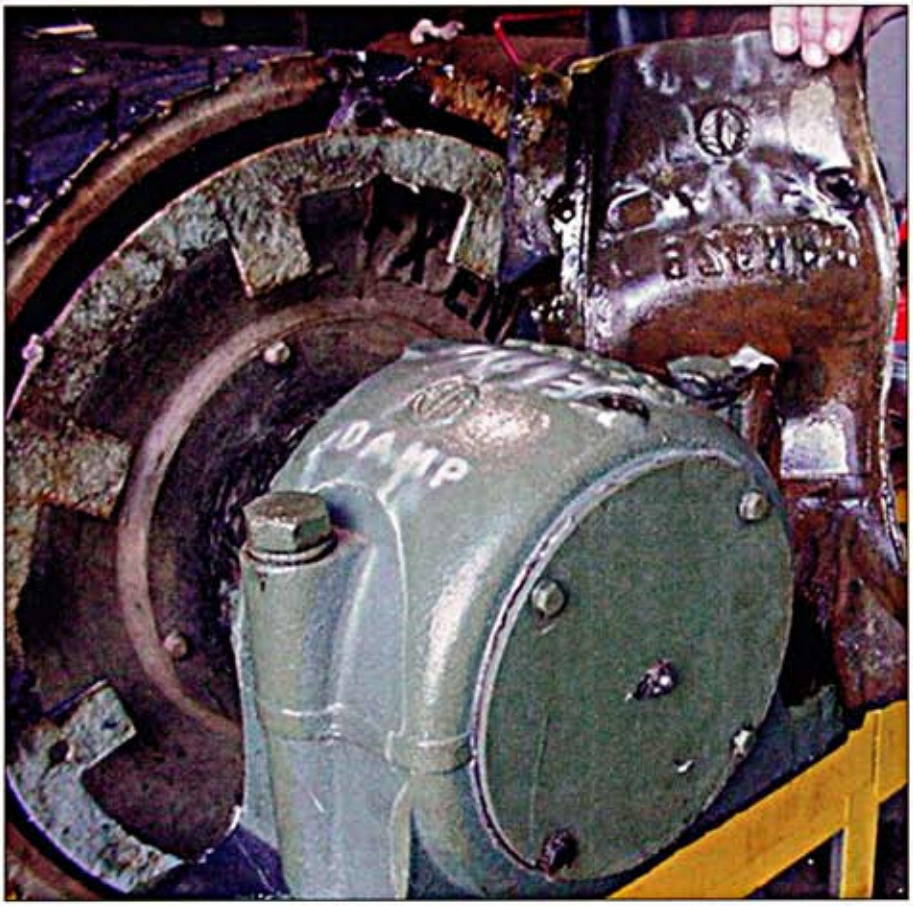
The pulley housing and the roller in the background were both subject to the same conditions. The pulley housing was protected by a mothballing product called Enviropeel. Photo courtesy of A&E Systems Ltd.



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with wood framing or rope, or using a new sprayable coating such as Enviropeel (see sidebar).

Before storing, wash the rig thoroughly and wire-brush any loose paint or rust, or use a pressure cleaner. Clean the surface with a suitable solvent or cleaner, touch up any paint, and then begin the mothballing process (see sidebar). Recommended procedures may also vary by manufacturer, so check with the manufacturer of your rig if you need clarification.

Here are some general minimum guidelines to follow when preparing your rotary rig for long-term storage.

- Drain, clean, and flush the pump drive gearbox and refill it with lubricant.
- Drain, clean, and flush rotation gearbox and winch gearbox and refill with lubricant.
- Drain radiators and refill with new coolant.
- Drain engine cooling system.
- Drain fuel system and spray inside of fuel tanks with a rust inhibitor.
- Drain fluid end of mud pump and remove pistons, piston rods, and valves.
- Lubricate the drill and chassis.
- Lubricate chains with liquid chain lubricant.
- Lubricate all points.
- Remove spark plugs or fuel injector units and inject a rust inhibitor into each cylinder.
- Remove the upper section of the mast and store separately.
- Open air line to atmosphere.
- Open drain cock at water injection pump.
- Cover and seal exhaust pipes and air cleaners.

Enviropeel creates a "second skin" of corrosion-inhibiting thermoplastic material that protects equipment. Here, the material is stripped away from a stored component. Photo courtesy of A&E Systems Ltd.

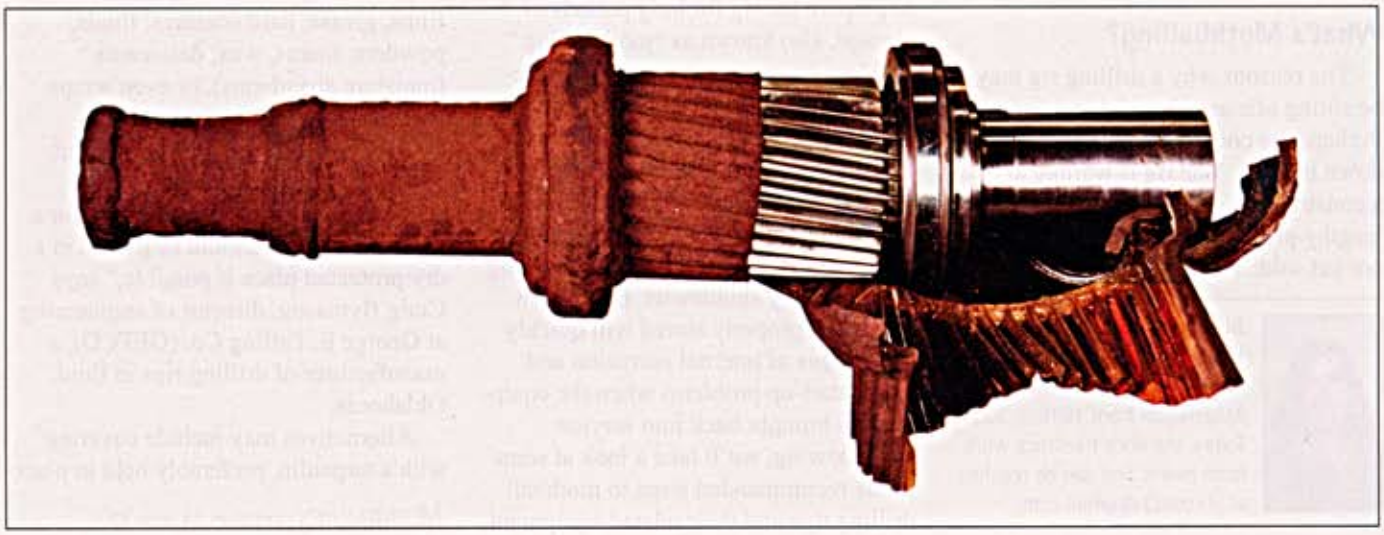

Table 1. Classes of rust preventative compounds. From Cortec Corp.'s *Mothballing Handbook*. Courtesy of Cortec Corp.

Class	I Thin Film	II Grease	III Anti-corrosion	IV Hard Coating	V Fluid	VI Crystal	VII Wrap	VIII Capsule	IX Wax	X Desiccant
Use	Displace Moisture	Anti-friction Bearings	Exterior Surfaces	External Surfaces	Oil Reservoirs Crankcase, Sealed Internal Surfaces	Sealed Internal Surfaces	Spare Parts	Electrical, Electronic Instruments Enclosures	Internal Surfaces	Sealed Internal Surfaces
Type	Solvent or Water Carrier	Number 2 Grease	Self-heating Grease	Solvent or Water Carrier	Oil-based Fluid MIL-P-46002A	Nitrite or Arine carboxylate Powder MIL-I-22110B	Paper or Plastic Film, Bags or Tubing	Foam or Plastic Capsules	Solvent Cutback	Granular Absorbent
Protective period, months, unsheltered outdoors	Not recommended	Not recommended	Over 12	24-48	Depends upon integrity of sealing. (Indefinite with tight sealing)	Depends upon integrity of sealing and amount of crystals used	Not recommended	Depends upon integrity of sealing. # of units used	1-12	Depends upon integrity of sealing and amount of granules used
Protective period months, sheltered outdoors	1-3	6-12	Over 24	24-48	Depends upon integrity of sealing. (indefinite with tight sealing)	Depends upon integrity of sealing and amount of crystals used	12-36	24	12-24	Depends upon integrity of sealing and amount of granules used
Protective period, months, indoors	6-12	12-24	Over 36	Over 48	Depends upon integrity of sealing. (Indefinite with tight sealing)	Depends upon integrity of sealing and amount of crystals used	12-36	24	Indefinite	Depends upon integrity of sealing and amount of granules used

- Cover any openings to guard against moisture and other contaminants.
- Coat gauges and controls with a protective coating.
- Coat mud pump liners, valves, valve seats, piston rods, and valve springs with a rust and corrosion inhibitor.
- Flush the hydraulic system according to manufacturers' guidelines. Drain the air tank.
- Retract all hydraulic cylinder rods so rods are not exposed.
- Change oil and filter in the truck engine and the rig engine.
- Disconnect batteries and remove from unit.
- Inflate tires to the proper pressure and consider blocking up the drill so the weight of the drill doesn't rest on the tires.

Do the following for cable-tool style rigs:

- Lock in the two clutches.
- Coat all moving parts with gear lube or heavy-grade grease.
- Do all of the other steps that apply from the first list.

Now the rig is cleaned, thoroughly prepped for storage, and stored safely—but your responsibilities aren't finished yet. You should check the status of your rig every so often, making sure it is still safely covered and reapplying lubricant as needed.

Newer Rigs

If you own a newer rotary rig, you may not need to go through the entire mothballing process.

"We feel the newer rotary rigs need to be operated on a timely basis," Bymaster says. "This would require starting the rig up every two to three

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Step-by-Step to Mothballing Your Rig

According to the *Lay-up and Mothballing Manual* published by Cortec Corp., a manufacturer of corrosion preventatives headquartered in St. Paul, Minnesota, this is the suggested order to tackle mothballing individual parts on a drilling rig.

1. Drill pipe and collars
2. Spring slips
3. Kelly spinner
4. Spinning wrench
5. Swivel
6. Rotary transmission
7. Rotary table
8. Hook block
9. Crown blocks
10. Drawworks
11. Wire line anchor
12. Auxiliary brake and cooling system (on larger rigs)
13. Mud pumps
14. Mud cleaner pumps and desander pump
15. Mud cleaner
16. Desander
17. Drill water tanks
18. Preload tanks
19. Potable water tanks
20. Preload diesel
21. Air compressor
22. Fuel oil tanks/purifier
23. Chemical extinguishing unit
24. Main engine(s)

The manual is freely available online and provides detailed instructions for undertaking each individual task. Although originally written for oil and gas drilling rigs, it is adaptable for water well rigs. To view the manual in its entirety, visit *www.cortecvci.com/publications/papers/watertreatment/pdf/mothball.pdf*, or contact samples@cortecvci.com for a CD version.

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months, raising the mast, and going through all the functions."

Operate for a couple hours to allow the oil to get to operating temperatures, he suggests. The oil will lubricate seals, bearings, and dry surfaces.

"Raising the mast and running the tophead up and down will help seals in the cylinders not become flattened due to cylinders lying horizontal for periods of time," Bymaster adds.

After operating the rig, draining off condensate from the hydraulic tank, compressors, and air system is recommended. Bymaster also adds you could "get by" without operating the mud pump if you have properly followed the mothballing procedures outlined earlier.

How long can a rig be mothballed?

"Fortunately, drill rigs are built to last, and can last quite a long time," Edwards says.

However, he cautions against letting a rig sit too long, for it may never see the inside of a job site again.

"Rigs placed in storage have been known to be cannibalized for parts for the contractor's other rigs that are still running." *WWJ*

Author's note: *Many thanks to John L'Espoir of EDSI for his assistance with this article. Read John's latest "Transfer of Technology" column on page 67.*

Enviropeel: Mothballing of the Future?

What is Enviropeel? It's a sprayable thermoplastic coating manufactured by A&E Systems Ltd., headquartered in the United Kingdom and manufactured in Malaysia. It has been around for about nine years.

Its unique spray-application method allows protection to be applied on site and to objects of any shape or size, old or new. Because it is applied with a sprayer, it provides a perfectly fitting, one-piece "second skin" barrier that blocks moisture and contaminants. Also, built-in inhibiting oils are constantly released onto the inner surfaces of the encasement and provide ongoing protection against corrosion.

If access is required to a piece of machinery that has been sealed, a seam can be cut around a door and resealed later. When bringing a piece of equipment back into service, the Enviropeel can be stripped off—and according to the manufacturer, it's reusable or recyclable. Material stripped from an object can be returned directly into the machine for reuse. It's also nontoxic.

According to the manufacturer's Web site (*www.ae-sys.com*), applications in Australia over the last three years have shown equipment lifetime estimates have increased by 500% using Enviropeel. For more information, contact the U.S. office of A&E Systems Anti-Corrosion Systems in Ponte Vedra, Florida, at (904) 819-8985 or usa@ae-sys.com.

Whether it is mothballing equipment or anything else, make sure you check out *Water Well Journal*'s interactive buyers guides before your next purchase. Go to www.ngwa.org/publication/guide/index.aspx.