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## As mower manufacturers prepare to roll out emission-compliant equipment, the industry provides some clarity on the impact Tier IV will have at the course level.

**F**rom the moment President Richard Nixon signed the Clean Air Act in 1970, industries across the country have been working toward improving the air we breathe. Be it cars and trucks on the roads or factories that dot our landscape... this crucial policy has saved countless lives by reducing harmful pollutants.

While the golf course industry has been at the forefront of many environmental issues, the Clean Air Act is now taking center stage as the new Tier IV begin to take hold.

Environmental Protection Agency's website reads:

*"EPA has adopted a comprehensive national program to reduce emissions from future non-road diesel engines by integrating engine and fuel controls as a system to gain the greatest emission reductions. To meet these emission standards, engine manufacturers will produce new engines with advanced emission-control technologies similar to those already expected for highway trucks and buses. Exhaust emissions from these engines will decrease by more than 90 percent. Because the emission-control devices can be damaged by sulfur, we are also adopting*

*a limit to decrease the allowable level of sulfur in non-road diesel fuel by more than 99 percent."*

These reductions in NOx and PM emissions from non-road diesel engines will provide enormous public health benefits. EPA estimates that by 2030, controlling these emissions would annually prevent 12,000 premature deaths, 8,900 hospitalizations, and one million work days lost.

The NOx – or oxides of nitrogen – form smog, while PM – or particulate matter – comes out of exhausts as smoke. The PM will see the most significant reduction – a 90-percent decrease from current standards.

While equipment manufacturers work closely with companies building the engines for their machines, Grant Young of Toro says his company and its competitors are waiting for final engine specifications before moving forward.

"From there, the equipment manufacturers have to make it work in the equipment, which is where engineering dollars for the equipment manufacturers comes into play," Young says.

Rachel Luken, Jacobsen product manager, says her company has taken a hands-on approach. "Jacobsen has been working in conjunction with our diesel engine supplier, Kubota, on technology methods and approaches to meet the lower emission standards," Luken says. "With Kubota's rugged and reliable engine expertise, coupled with Jacobsen technical staff, we believe we are designing and incorporating engines, filtration and electric needs in efficient and innovated ways.

Jacobsen will be utilizing multiple solution paths for the range of products affected, such as:

- Conventional Tier 4 Final path using fuel injection and exhaust after-treatment technologies, while also paying close attention to the machine's hydraulic and electrical efficiencies so optimal power is transferred; and
- Utilizing engines under 25 hp by reducing

**VIEW**

by Rob Thomas

power without compromising overall performance or supplementing with hybrid power to manage peak power demands.

"Jacobsen is also striving for commonality and consistency where possible between existing product and across newly powered product to reduce customer technical maintenance and service parts complexity," Luken says.

"Ultimately, Jacobsen is using innovative solutions to make equipment more environmentally friendly while still meeting customer performance, productivity and quality expectations," she adds.

Mark Ford, marketing manager at John Deere Golf, says his company is looking beyond the Tier IV standards.

"Our objective is to do more than meet

## Replacement plan

Jacobsen offered a few thoughts to consider as capital equipment budgets are developed for new or replacement equipment:

- **Buy on regular routine:** When a capital equipment plan calls for new equipment and/or existing equipment useful life ends, buy what is available and pay market price.
- **Buy ahead:** Prices are forecasted to rise when Tier IV compliant equipment is released, so postpone the purchase of higher-priced equipment and buy in advance of a regular replacement cycle.
- **Buy environmentally friendly:** Despite the expected higher prices, actively seek out and purchase the greenest Tier IV product.
- **Buy used:** Since equipment is compliant based on the year of engine manufacture, buy equipment that is already in use.



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the requirements of Final Tier IV," Ford says. "We are using this as an opportunity to provide additional value for golf course superintendents and technicians."

The John Deere approach is five-fold:

- **Optimized.** Engineering and product development teams are working to ensure the equipment fully meets regulatory requirements, while delivering the power, reliability and low cost of ownership.
- **Fluid efficiency.** Rising fuel costs are on everybody's minds. Deere's Final Tier IV-compliant equipment will not compromise on fuel efficiency.
- **Field proven.** Deere engages in a comprehensive program of field testing prior to new equipment launch. Machines that meet these new standards undergo thousands of hours of testing before they are released.
- **Integrated.** Deere's engineering, supply management and product management teams have been engaged in a thorough, ongoing design review with engine and component suppliers to work hand-in-hand to supply the most seamless solution possible.
- **A Fully supported solution.** A history of agricultural and construction equipment manufacturing means the John Deere enterprise has a great deal of experience transitioning to new compliance standards. They will be there as an organization for customers every step of the way.

Positives are plentiful, but John Patterson, president of the International Golf Course Equipment Managers Association, expects to see the price for new equipment rise substantially.

“When it comes to cost increase, the number I am hearing most often is 20 percent for affected machines which remain diesel powered, and between 10 and 15 percent for machines which are converted to gasoline power, to cover the cost of development.”

— John Patterson, International Golf Course Equipment Managers Association

“When it comes to cost increase, the number I am hearing most often is 20 percent for affected machines which remain diesel powered, and between 10 and 15 percent for machines which are converted to gasoline power, to cover the cost of development,” Patterson says.

“At PGA National we are evaluating the cost benefits of turning our large equipment fleet (for 90 holes) one year early, potentially saving \$100,000 in purchase cost, plus R&M savings,” he says. “It is difficult for any operation to accelerate capital purchase plans, but potential six-figure savings are very persuasive.”

There are other options, Patterson says, but at what cost?

“There may be a slight increase in the used equipment market, but generally the increased cost of running older equipment far offsets the higher initial cost of new, efficient – and warrantied – stock,” he says. “Those who would normally purchase outright may be more likely to look at leasing for tax benefits to offset the purchase cost as well.”

While the Tier IV regulations are forcing changes and likely adding cost, Luken says Jacobsen has evolved with the environment in mind since the Clean Air Act amendments affected off-road diesel regulations

(continued on page 79)

## New standards

Considering the shakeup across the industry - from engine and equipment manufacturers to golf courses – many wonder if the Tier IV emissions regulations constitute the “finish line” or if there are even higher standards to meet on the horizon.

“I believe we will be done with this type of regulation for a while, but it is anyone’s guess,” says Stephen Tucker, equipment manager for the Ritz-Carlton Members Golf Club in Bradenton, Florida. “Regulations are driven by government policy, so as new policies are approved and mandated, our regulations will change. Nature of the beast, I guess. Maybe one day they will ask the effects of the policy before implementing it, but of course why would they do that ... makes too much sense?”

Tucker sees potential for fleet changes at many courses.

“I believe you will see a gas version of many of the machines that will fall into Tier IV,” he says. “I really believe this is the direction that most facilities will go as long as the machine can perform to the same level and the costs remain where we currently are or less.

“If you’re an equipment manufacturer this becomes an even tougher question because they are not sure what direction the industry will go, so you can’t really put all of your eggs in one basket ... or at least I wouldn’t.”

John Patterson, president of the International Golf Course Equipment Managers Association, joked “Tier IV is it until we all get the new ‘Mr. Fusion’ power plants.”

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# Design it **FORWARD**

In his analysis, GCI's Bob Lohmann questions whether simplifying golf adds value and suggests that bunkers may hold the real key. By Bob Lohmann

**M**any of us course design types are recently back from Chattanooga, Tenn., site of the 2012 American Society of Golf Course Architects annual meeting. There's a lot of fraternizing that goes on at these events, but there's a good amount of strategizing about where the game is going, too. Big picture stuff.

Everyone's hearts are in the right place, I'm certain of that. But I'm quite amazed these days by how architects and other "guardians of the game" view that big picture. More and more, these big-picture conversations seem to be shorthand for reduc-

ing the length and difficulty of golf holes, and/or enabling the play of golf holes in less and less time.

The catch here, and it's a big catch, is that we may be removing interest from those golf holes. We may be devaluing them.

My old friend, the architect Gary Panks, spoke for me at one point when he warned that all these efforts to play faster and get more golfers on/off the course will, if we're not careful, destroy some really good golf holes. Earlier this year, I wrote about this in light of the Tee It Forward initiative – a good idea for adapting full-sized holes to young and otherwise novice players. But it's

a tough task to carry this through an 18-hole routing, accommodating senior and women players, without effectively addressing the design of all 18 holes. You have to Design It Forward in order to Tee It Forward, and we have to ask ourselves: Is this initiative worth undertaking that expense? Is it worth risking the alienation of regular customers who appreciate the hole as is?

The way we think about bunkers today is indicative of where these discussions are taking the golf business, perhaps against our better judgment. When we aren't talking about eliminating bunkers – to save money and make golf holes more "playable"

(read: *boring*) – we're talking about ways to make them more expensive via new liners and premier sand products.

One extreme feels like a shortcut. The other feels like we're throwing money at something in the name of "excellence." Neither gets at the heart the matter, in my view.

Let me frame the larger issue another way – a way superintendents will understand, because they think in these terms all day, every day – way more than architects do incidentally: Do these measures and initiatives add value? If so, for how many golfers do they add value?

If we want to attract new golf-



our courses and clubs. Throwing some tee markers down in fairways to create a 3,000-yard routing is a way to add value for kids and their parents – and most important, it's simple. That act does not affect the hole's value for other players.

It becomes much more complex, say, when you try to move the white tees forward for seniors, who then hit the ball into unseen hazards, or drive the ball past landing areas into the narrowest parts of fairways. This does not add value. In order to add that value, an entire hole must be assessed in light of what type of golfer is playing that new yardage.

Let's boil it down and get specific: You know what adds value? Bunkers add value. Their role should be separated from the pace-of-play and course-difficulty equation. Eliminating them in the name of faster, easier play might save money or maybe even drive revenue in the short term. But ultimately, in the longer term, removing them waters down the value of golf holes.

Superintendents work at the confluence of these issues. It's a balancing act, reconciling pressure from the top to make holes harder, make them easier, speed up play, bring down costs, etc. Superintendents do the actual balancing. They're the ones who've always been best equipped to determine where the value is, where it can be preserved, where it should be added.

Back to the bunkers... How do you make a course harder? You make it longer and tighter right? A lot of people think bunkers make a course harder, but they don't. Properly placed, they add value. Allow me to count the ways.

**DIRECTIONAL AID.** Down in Tennessee, we ASGCA-ers played

the Honors Course, an unfamiliar track for most of us. I can't tell you how many times my caddie, or the player in our group with local knowledge, told me to "Aim for that bunker", or "Play in front of that bunker", or "Fly that bunker." You can't do that with distant trees lining a fairway. If you eliminate too many bunkers in the name of cost-cutting, what's left? Does that add value?

**FLEXIBILITY/STRATEGY.** Bunkers provide golfers the opportunity to play tactically, using the hole's width, whereas trees do not. A long dogleg lined with trees will crush the new or short-hitting player. If they can't get to the corner, they're screwed. But if that corner is guarded by bunkering, he/she can play in front and cut the corner on the next shot. I'm not advocating for a sea of bunkers, but a wide fairway with a smattering of well-placed bunkers can be played a hundred different ways, most of them attainable by new or short-hitting golfers. That's value for all players, not just good ones.

**RECOVERABILITY.** Sand shots aren't easy to master, but even a novice player would rather play from a fairway bunker than a forest. You can't play at all from a pond, of course. Catch bunkers are an inherent sign that trouble lurks beyond, and they can actually protect golfers from unseen hazards. Now, let's be honest: An "unseen" hazard is problematic in its own right, but that bunker serves a distinct purpose. Can't put a value on that.

**AESTHETICS.** Bunkers break up the monotony of green. They provide texture and contrast from the tee. On a dead straight hole, extending bunkers out into the line of play makes the

fairway appear to weave back and forth between them.

**HARMONY/BALANCE.** Bunkers help to achieve visual balance and establish scale and proportion, which contributes to the visual harmony of a hole. In other words, they make things look pleasing. In some cases, they can even be placed to make things look intentionally unpleasing (harder than they are) or to affect depth perception (camouflage).

Think about all the trees on your golf course. How much value do they add to the golf experience? They can certainly evoke pleasantness, but maybe a handful of trees have the sort of comprehensive impact mentioned above. The rest are either inconsequential or actively eliminate value – shot values, but also agronomic value when you consider how trees compete with turf for soil nutrition and sunlight.

Now think about your bunkers. How many add value? In a variety of circumstances, I'm betting they all do. And I'm betting most superintendents could think of a half dozen more, in key spots, that could add even more.

My point here isn't that we should go on a bunker-building binge. My point is, we need to assess our golf courses based on the value each feature provides. It's a cost-benefit analysis in one way.

With the resources available, we must maximize the value we provide to golfers because it's the value of that golfing experience – not ease, not speed of play – that hooks new players and continually engages regular players. **GCI**

*Bob Lohmann is founder, president, and principal architect of Lohmann Golf Designs and a frequent GCI contributor.*

ers, does it really make sense to simplify golf courses en masse? What happens when these novices develop into intermediate players – won't they go elsewhere? I have to laugh when I hear people reminisce about the crappy old munis they played as kids. Yeah, they might romanticize those courses, those memories – but they wouldn't be caught dead playing those tracks today. They were all they knew back then. When they got a glimpse of what a good course could provide, in terms of value, there was no going back.

We need to do a better job of creating and preserving value for our customers, the golfers at



**Jeffrey D. Brauer** is a licensed golf course architect and president of GolfScapes, a golf course design firm in Arlington, Texas. Brauer, a past president of the American Society of Golf Course Architects, can be reached at [jeff@jeffreydbrauer.com](mailto:jeff@jeffreydbrauer.com).

## TREE PLANTING – GOLF DIVISION

**G**iven the importance of trees to your golf course, “now” is always the time to develop a long-term plan for these important landscape elements. Some courses hire landscape architects for tree planting plans, failing to realize what a golf course architect brings to the task. Those talented, well-intentioned landscape architects then often locate the wrong trees in the wrong places, out of an ignorance of good golf. Many golf course architects are also landscape architects, and can consider all aspects to your tree planting master plan. These will include:

**IT’S A GOLF COURSE.** Strategy and playability trump landscape beauty. That small tree planted on the inside corner of the dogleg may eventually grow into a problem, blocking shots or narrowing the play corridor. Only golf course architects know what those effects may be. Golf course architects also understand where trees may aid safety, frame or block views, control and direct traffic, etc.

I once hired a non-golfing, college student as a summer intern and took him to a meeting for experience. Ignoring my instructions to remain silent, he burst in to suggest plantings of pines in play areas, believing that lost balls contributed to difficulty, which he thought was a good thing on a public golf course.

It’s not an arboretum. Turf health also trumps landscape beauty, making trees of secondary importance to shade, framing, safety, etc. A golf course architect also considers the relatively high cost of various species (such as breaking limbs and short lifespan of cottonwoods) or use of attractive, but non-native species that require regular high maintenance practices that don’t necessarily reflect in your bottom line when devising a tree plan.

**IT’S NOT AN ARBORETUM, BUT...** While it’s usually best to avoid the highly flowered Augusta National look in most cases, sometimes, landscape accent is required. A common mistake is to put ornamental plantings in areas where they will gobble golf balls. A golf course architect will know where limited ornamentals will get multiple views, while avoiding slow play.

**IT’S NOT A SOD FARM, EITHER, BUT...** Golf turf often has higher traffic than a park, and the turf takes precedence. Tree locations should consider allowing early morning sunlight to reach tees and greens.

**WATER CONSERVATION.** Studies show that most trees require most soil moisture than turf. Most courses need to conserve water, so golf courses should factor landscaping into their irrigation scheme. Some locales have ordinances dictating both decreased irrigation use and increased tree planting, which can be contradictory. One way to counter it is to use water miser trees, wisely incorporate native species. In some areas, water quality affects tree canopy, requiring drip irrigation. Irrigation lake location/expansion/design etc. is also best suited for a golf course architect to design.

**LONG-TERM EFFECTS.** If done as part of a long-term master plan, the golf course architect will consider not only where the greens and tees are now, but also where they will be at the completion of the master plan.

**It’s not an arboretum.** Turf health also trumps landscape beauty, making trees of secondary importance to shade, framing, safety, etc.

**LONG-TERM EFFECTS PART II.** A healthy tree community requires annual replacement of 2-10 percent of its total trees. A careful tree management plan allows you to maintain a majority of your trees in their primes. Long-term thinking also reduces the emphasis on a currently popular, but unproven trend, which may not be durable – think dutch elm disease. I’ve seen young landscape architects ignore hard-learned past lessons in using borderline hardy trees in tough climates. Old timers know that extreme conditions killed off similar trees well before the “young pup landscape architects” were even born.

**CLUB POLITICS.** Given the sensitivity towards tree issues, your golf course architect should be more in tune with the course politics, and probably better at guiding the decisions through your political process.

**SHORT VERSION.** Don’t forget your trees in long term planting, and don’t forget that your golf course architect is probably the most conversant in how trees affect your golf experience. **GCI**

**Terry Buchen**, CGCS, MG, is president of Golf Agronomy International. He's a 41-year, life member of the GCSAA. He can be reached at 757-561-7777 or [terrybuchen@earthlink.net](mailto:terrybuchen@earthlink.net).

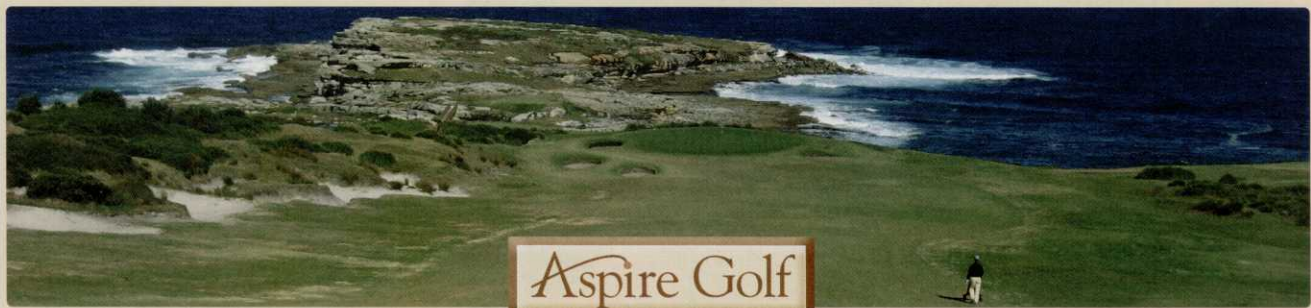


## Travels With Terry

Globetrotting consulting agronomist Terry Buchen visits many golf courses annually with his digital camera in hand. He will share helpful ideas relating to maintenance equipment from the golf course superintendents he visits – as well as a few ideas of his own – with timely photos and captions that explore the changing world of golf course management.

## RACKS FOR SPARES

This triangle-shape design houses two sets of triplex greens mower cutting units along with one set of verticut reels. The 1 x 1/8-inch thick welded mechanical square tubing is 50 inches high, 32 inches wide with 5-inch diameter heavy-duty rubber caster wheels. The height is limited to no higher than chest height for safety and for easier handling. The platform shelves are 12 x 24 inches using 1/2-inch thick CDX plywood attached to the 1-inch square tubing with #10 self-tapping screws with #10 fender washers. The backstops for the rear rollers are 2 1/2 inches high and 18 inches apart that are welded in place. The triangle shape and caster wheels make it very easy to rotate the rack for easy on and off of the spare units. The materials cost about \$100 and it took about six hours of labor time. Another option would be to use aluminum, which is lighter, but more costly and difficult to weld. Tom DiFonzo, CGCS; Jason W. Bryant, equipment manager; Steve Powell and Mario Linardo, assistants, make up the team at the Laconia Country Club in Laconia, N.H.



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in the mid 1990s.

Many Jacobsen models will ultimately go through as many as five different lower-emissions standards: Tier 1-3, Tier 4 Interim, and Tier 4 Final," Luken says.

"In past tiers, the adaptation of the new lower-emission-com-

pliant engines into equipment was more streamlined," she says. "In most cases the changes were internal to the engine with minimal mechanical and electric affect to the host pieces of equipment. Therefore, the cost to the market place were typically absorbed or incorporated into normal pricing cycles."

**"The best way to lessen the impact is being proactive in planning out your equipment purchases or leases for the next eight years. Whether you have the capital money to spend or not, there should always be a plan."**

*— Stephen Tucker, equipment manager,  
Four Seasons Resort and Club*

pliant engines into equipment was more streamlined," she says. "In most cases the changes were internal to the engine with minimal mechanical and electric affect to the host pieces of equipment. Therefore, the cost to the market place were typically absorbed or incorporated into normal pricing cycles."

Now with the upcoming new Tier 4 Final, the cost to make engines and equipment meet the lower emission standards is much greater – significant R&D, engineering, development and testing investments are being spent by both engine and turf equipment manufacturers to ensure their ability to meet the standards, Luken says.

"Tier 4 Final compliance means much more than just an engine change," says Luken. "There are many more components and subsystems external to the engine that will need to adapt."

According to Luken, the Tier 4 Final turf equipment will be outfitted with new engines and exhaust systems with advanced electronic controls, additional filtration and after-treatment, and updated cooling systems, to name a few. To accommodate

these new, additional, and larger components, many turf equipment chassis, engine compartments, and functional controls require redesign... leading to added costs.

Young agrees that the previous tiers of compliance haven't been

as onerous in terms of technology, complexity or cost.

"Most have been transparent – or of nominal consequence – to the end customer," he points out. "That says, we are always looking at alternative fuel/energy options, many of which have benefits – one being lower emissions – but typically come with a cost."

As for the increased cost to the consumer, Young says attempts to lessen the financial impact by Toro is always ongoing.

"One thing to remember in this is the engine, and decks/cutting units are usually the majority of the expense as it relates to a mower," Young says. "So, when the cost of the engine goes up significantly, you have to look very hard at the rest of the machine to recoup or find cost savings to offset, and weigh that against what those may mean in terms of performance and/or customer satisfaction."

Stephen Tucker, equipment manager, Four Seasons Resort and Club, Dallas at Las Colinas, believes looking well into the future will soften the economic impact of Tier IV regulations.

The best way to lessen the

impact is being proactive in planning out your equipment purchases or leases for the next eight years, Tucker says.

"Whether you have the capital money to spend or not, there should always be a plan," he says.

Tucker also believes general managers and owners need to get educated on Tier IV now so they can make the right decisions going in, or at least know the impact.

"It is much easier to plan for bumps in the road than to have to make a decision once you have it right in front of you," Tucker says.

He adds that everyone needs to be open to the alternatives such as gas engines.

"At the end of the day, if we can get the grass cut without sacrificing quality for less money, then that is the decision we should be making right now," Tucker says.

While the new systems and technologies come with a price, they may also allow improvements to engine noise, sound levels, performance and diagnostic capabilities that may provide return on the purchase price investment, according to Luken.

"Jacobsen is also exploring innovative, non-conventional approaches where technically feasible to deliver lower emissions and meet compliance where needed using additional non-diesel power to manage peak power demands," Luken says. "A hybrid-powered solution would alleviate a portion of the equipment's total cost of ownership by offering fuel savings up to 40 percent annually."

She points to the Jacobsen Eclipse 322 riding greens mower as an example. It utilizes true hybrid power – lower hp engine coupled with buffer electric power to deliver equivalent total system power – and when com-

paring that to other all-engine-powered and hydraulic machines in its class, it delivers significant annual fuel savings, as well as saving on hydraulic oil since it is an all electric machine.

Jacobsen offers an online cost savings calculator to estimate possible savings ([www.jacobsen.com/eclipse-calculator/](http://www.jacobsen.com/eclipse-calculator/)).

If the bottom line is cost, Tucker sees a great deal of uncertainty.

"In an economy that is unstable with rising fuel costs and a business that needs some normalcy, this will make an impact which some are addressing now," he says. "We have been asking for advancements in technology over the years and the manufacturers have delivered with hybrids and such.

"However, at the end of the day, in the current economic climate," he adds. "We just need to get the grass cut for the least amount we can do so without impacting the quality.

"We can work on advancements later," Tucker concludes. "Let's make some cost-effective machines and get past this rough spot, then push toward technology advancement again."

Patterson knows superintendents and course management will adapt.

"The IGCEMA's tag line is 'Educating technicians for the future' and we hold the belief that any new technologies developed within our industry can/will be mastered through education," Patterson says. "Just as with any other new technology (or change), most will embrace it, many will complain, some will resist it, mistakes will be made, but ultimately it will become mainstream." **GCI**

*Rob Thomas is a Cleveland-based freelance writer and frequent GCI contributor.*

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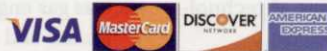
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