



# The Truth about Fracking

*What the protesters don't know*

BY KEVIN D. WILLIAMSON

IN the middle-of-frackin'-nowhere Pennsylvania, Boy Genius is showing off his giant robot: It's about 150 feet tall, God and the almighty engineers alone know how many hundreds of tons of steel, and four big, flat duck feet on bright orange legs. "Yeah, this is kind of cool," he says of his supersized Erector Set project. "You can set those feet at 45 degrees, and it will walk around in circles all day," a colleague adds.

But Boy Genius is not letting himself get too excited about all this—it's pretty clearly not his first giant robot, and he's a lot more excited about his seismic-imaging system: "It's kind of like a GPS, but it's underground and it works with the Earth's magnetic characteristics." Nods all around—that *is* cool. Everybody here has a three-day beard and a hardhat and steel-toed work boots, but there's a strong whiff of chess club and Science Olympiad in the air, young men who are no strangers to the pocket protector, who in adolescence discovered an unusual facility for fluid dynamics and now are beaver away at mind-clutchingly complex technical problems, one of which is how to get a 150-foot-tall tower of machinery from A to B without taking it apart and trucking it (solution: add feet). That giant robot may walk, but it isn't too fast: It can take half a day to move 20 feet, because this isn't a Transformers movie, this is THE PLAY, and Boy Genius is a member of the startlingly youthful and bespectacled tribe of engineers swarming out of the University of Pittsburgh and the Colorado School of Mines and Penn State and into the booming gas fields of Pennsylvania, where the math weenies are running the show in the Marcellus shale, figuring out how to relentlessly suck a Saudi

Arabia's worth of natural gas out of a vein of hot and impermeable rock thousands of feet beneath the green valleys of Penn's woods. Forget about your wildcatters, your roughnecks, your swaggering Texans in big hats: The nerds have taken over.

The weird little in-house argot of gas exploration has more plays than Stephen Sondheim: the conventional gas play, the shallow gas play, the Gothic play, the Wyoming play, and the gold-plated godfather of them all, the Marcellus play, which stretches from West Virginia to New York and contains hundreds of trillions of cubic feet of natural gas. Exactly how much recoverable gas is down there is a matter of hot dispute, but the general consensus is: a whole bunch, staggering amounts quantified in numbers that have to be written in exponential expressions (maybe it's  $1.7 \times 10^{14}$  cubic feet, maybe  $4.359 \times 10^{14}$ ), with the estimates on the higher end suggesting the equivalent of 15 years of total U.S. energy use. There's so much efficiently combustible stuff down there that the boy geniuses have to spend hours in esoteric preparations for what to do about the oil and gas they hit that they don't mean to—they're after the Marcellus gas, but there's a lot of other methane on the way down.

Given that oil imports account for about half of the total U.S. trade deficit, that U.S. policymakers suffer from debilitating insomnia every time some random ayatollah starts making scary noises about the Strait of Hormuz, and that about half of American electricity comes from burning coal—which, on its very best day, is a lot more environmentally problematic than natural gas (something to think about while tooling down to Trader Joe's in your

45 percent coal-powered Chevy Volt or Nissan Leaf)—exploiting natural gas to its full capability has the potential to radically alter some fundamental economic, national-security, and environmental equations of keen interest in these overextended and underemployed United States. Tens of thousands of new jobs already have been created (want \$60,000 a year to drive a water truck with a \$2,000 signing bonus? Pennsylvania is calling), and tens of billions of dollars in new wealth has been injected into the ailing U.S. economy, since Marcellus production really picked up around 2008. Pennsylvania and West Virginia saw 57,000 new Marcellus jobs in a single year, as firms ranging from scrappy independents to giants such as Royal Dutch Shell poured billions of dollars into shale investments—land, equipment, buildings, roads, machinery: capital, in a word. Massive capital.

Cheap, relatively clean, ayatollah-free energy, enormous investments in real capital and infrastructure, thousands of new jobs for blue-collar workers and Ph.D.s alike, Americans engineering something other than financial derivatives—who could not love all that?

Josh, mostly.

EVERYBODY in the Marcellus play is on a first-name basis with Josh Fox, even though few of them have met the young director who with a single fraudulent image in his documentary *Gasland*—footage of a Colorado man turning on his kitchen sink and setting the tap water on fire—brought into existence a new crusade for the Occupy Whatever set and a new Public Enemy No. 1 for the Luddite Left: gas exploration, specifically the extraction technique of hydraulic fracturing, popularly known as “fracking.”

Fracking works like this: You set up your giant robot and you drill a five-inch-diameter hole down several thousand feet until you hit the gas shale, and then you turn 90 degrees and you drill horizontally through some more shale, until you’ve got all your pipes and rig in place. And then you hit that shale with a high-pressure blast of water and sand, creating millimeter-wide fractures through which the natural gas can escape and make you very, very rich in spite of the fact that you’re spending about a million dollars a week on space-age “matrix” drill bits and squadrons of engineers and a small army of laborers, technicians, truck drivers, machinists, and a pretty-good-sized bill from Hoggfather’s, the local barbecue joint that has added a couple of specialized and custom-outfitted mobile crews just for cooking two massive meals a day for the fracking hands who are far too busy to take off for lunch. (Sure, ExxonMobil is going to be making a killing, but fracking’s biggest boosters may be the local restaurateurs who are cooking with gas while cooking for gas, and are happy to serve workers straight from the field: “No Mud on the Floor, No Cash in the Drawer” says the sign in a local diner.) The water makes the fractures, and the sand keeps them open. There’s some other stuff in that fracking blend, too: biocides, for one thing, not very different from what’s in your swimming pool, to keep bacteria and algae and other gunk from growing in the water and clogging up the works. There are also some friction reducers, because water and sand moving at speed can produce a lot of wear and tear (cf. the Grand Canyon), and the occasional jolt of 7 percent hydrochloric acid solution for boring out holes in the concrete. The mix is 99+ percent water and sand, and the rest of the stuff is mostly run-of-the-mill industrial

chemicals (those friction-reducers use a polymer that also is used in children’s toys, for example). Real concerns, but not exactly an insurmountable environmental challenge.

Not only is this happening more than a mile beneath the surface, it’s also happening at a level that is separated from the closest points of the aquifer by a layer of impermeable rock three or four or five Empire State Buildings deep. “We couldn’t frack through that if we were *trying* to,” says one engineer working the Marcellus. “The idea that we could do so by accident is crazy. Not while we’re fracking with water and sand. Nukes, maybe, but not water and sand.”

So what about that burning water?

THE weird true thing is that water has been catching fire for a long time—“long time” here meaning way back into the mists of obscure prehistory and the realm of legend. The temple of the Oracle of Delphi was built on the site of a burning spring said to have been discovered by a bewildered goatherd around 1000 B.C., and sundry antique heathens across the Near East had rituals related to burning bodies of water. The geographically minded among you will appreciate that there are several places in the United States named “Burning Springs,” including prominent ones in such energy-intensive locales as Kentucky and West Virginia. There’s a Burning Springs in New York, too, and 17th-century missionaries wrote in awe about Indians’ setting fire to the waters of Lake Erie and nearby streams. Water wells were catching fire in Pennsylvania as early as the 18th century, well before anybody was fracking for gas.

You wouldn’t know it from watching *Gasland*, but that Colorado community made famous by the film has had water catching on fire since at least the 1930s, and the Colorado division of water chronicled “troublesome amounts of . . . methane” in the water back in 1976. As it turns out, places that have a lot of gas in the ground *have a lot of gas in the ground*. And sometimes that gas is in the water, too, as the result of natural geological processes.

Which isn’t to say that gas drilling can’t muck up drinking-water wells. That can and does happen—but it has nothing to do with fracking. If anything, fracking is less likely to pollute groundwater than are other forms of drilling, because it happens so far from the water, with so much rock in between, which isn’t the case with shallower wells and more traditional forms of gas exploration.

“Methane migration is real,” says John Hanger, an environmental activist in Pennsylvania who served as head of the state’s department of environmental protection under the liberal governorship of Democrat Ed Rendell. “Prior to the Marcellus, there have probably been 50 to 150 private water wells, out of more than a million in the state, that have had methane contamination as a result of mistakes in the drilling process—but that has nothing to do with fracking. Some in the industry deny that it ever happens, and that is false. But frack fluids returning from depth, from 5,000 to 8,000 feet under the ground, to contaminate an aquifer? When the industry says that’s never happened, that has in fact *never happened*.”

Colorado’s gas regulator took the unusual step of releasing a public debunking of *Gasland*’s claim that fracking is responsible for that flaming faucet. Confronted with the facts—call them “an inconvenient truth”—Fox responded that they were “not relevant.” But what is not relevant is that image of a burning water

faucet, at least if you want to understand the facts about fracking, which the anti-frack fanatics don't.

**T**HE problem with fracking mostly isn't what goes down the pipe, but what comes up, and the real hairy environmental challenge turns out to be the relatively un-sexy matter of wastewater management. Gas drillers put their bits down through a lot of ancient seabeds, meaning that the water comes up saturated with our tasty friend NaCl, a.k.a. salt. Given that a great many examples of aquatic and riparian flora and fauna are evolved to do well in fresh water but curl up and die in salt water—especially salt water that's considerably saltier than the saltiest seawater—you can't just dump that stuff in the Susquehanna River. And then there's potassium salts and such. And then there's other stuff that comes up, too, substances you'd just as soon see remain buried in the depths of the earth: arsenic, for one thing, and the darkly whispered-about entity known in drilling circles as NORM—Naturally Occurring Radioactive Material—and various other kinds of VERY BAD STUFF. Of particular concern is the presence of bromides, which, when combined with the chlorine used in water-treatment facilities, have a worrisome tendency to turn into the SEAL Team Six of volatile organic compounds, basically a big flashing neon sign reading "CANCER."

There are other workaday environmental problems endemic to fracking: For the three to five days a frack lasts, it's loud—really, really loud, because it's basically a construction site, with a vast array of pumps and compressors and giant margarita mixers blending sand into the water, and a big battery of generators to run it all. There's not much to be done about the noise, though you're typically not fracking real close to densely populated areas. A few firms have hit upon the novel approach of simply offering nearby homeowners money to go away for the week, expenses paid, or at least putting them up in a hotel for the duration. (An idled fracking rig might cost you \$1 million a week—you can afford to pay a lot of HoJo bills to keep that from happening.) The trucks cause traffic snarls, so they're building more pipelines to replace the trucks, but digging pipelines can be an inconvenience, too. Fracking for gas is not zero-impact. There's no easy way around that.

And there's certainly no easy way around the water issues, either. Disposing of wastewater is a challenge from all sides: PR, economic, technical, environmental, and economic. But a number of the drillers have come up with a nearly ideal solution for disposing of it: Don't.

**A** COUPLE of hundred miles away from Boy Genius and his giant robot, in the Marcellus heartland of Williamsport, Pa., is TerrAqua Resource Management, one of the many private firms that have sprung up throughout THE PLAY to do what the local wastewater-treatment plants and municipal authorities aren't equipped to do and probably shouldn't be expected to do: treat nasty drilling water so that it can be used again. Trucks pull up, unload their murky liquid cargo, and then fill up on usable water to take back to the next job. Inside, a trio of vast water tanks, chemical vats, some sand filters, and a bunch more engineers make that water reusable. The facility has been up and running for only a couple of years, but millions of gallons of water already have passed through it. The solids get filtered out and disposed of,

bacteria get biocided, and everybody makes the department of environmental protection happy by providing a government-certified "beneficial reuse" of drilling water.

Interesting thing: The place doesn't stink. It's got a slightly earthy smell to it, like the nursery section at Home Depot, but it doesn't smell like you'd expect a water-treatment plant to smell.

TerrAqua makes its living from the dirty end of the gas business, and its executives are under no illusions about the industry. There are good eggs—or at least self-interested, large-cap eggs who appreciate how much they have to lose if they get sloppy—and then there are what the locals call the "gassholes," by which they do not mean to denote the channel down which the pipe goes.

"There's *compliance*, and there's *high compliance*," says TerrAqua vice president Marty Muggleton. "There are companies that like to have a lot of extra cushion between where they are and where they have to be, and then there are those who like to get their toes close to the edge. And I think the industry has figured out which one of those you really want to be."

The one you want to be, everybody from environmental activists to industry insiders says, is a company like Range Resources, a Texas-based firm that owns a big part of THE PLAY south of Pittsburgh, operating out of the hamlet of Canonsburg, Pa., near the West Virginia border. Like practically everybody else in town, they have a bunch of shiny new space in a corporate park that was barely half-populated until the Marcellus began to get going. It's a busy anthill with a lot of boots and surprisingly few suits. Range is one of the companies that have figured out that there's so much money coming out of the shale—even with gas down near \$2—that it pays to go above and beyond. Their trucks tear up the roads in Canonsburg, so they build newer and better roads than the ones they found, spending more money on roads than the city itself does. There are a surprising number of speed traps around town, but they aren't the local Barney Fifes: They're contractors hired by Range, keeping an eye on the company's drivers, who get fired for speeding or otherwise behaving in a gassholish fashion. The old days of what they call "Texas-style" gas development are mostly in the past: The billion-dollar boys have a lot of resources to throw at environmental problems and a lot to lose.

"Pennsylvania used to have surface disposal," says Range's Matt Pitzarella, "and West Virginia still does. That's just crazy." "Surface disposal" means "just dumping it in the river or on the ground." Pennsylvania, he points out, has a long history of environmental grief related to the energy industry, from acidic mine discharges to thousands of forgotten (and not always well-capped) oil wells dating from back in the days of Colonel Drake, the genius who noticed that farmers drilling water wells kept hitting oil and figured he might as well drill for the oil. Thousands of steel casings were ripped out of wells during World War II, and thousands of miles of waterways in the state have been befouled, mostly by mine discharges. Natural gas is pretty clean at the combustion point, and Range wants to be the firm that shows how clean it can be during the preceding stages. "If anything, the microscope that we as an industry are under has made us more innovative. Some of the tactics they use may be unfair. It's not fair to paint us all with the same broad brush. But at the same time, it's not fair for the industry to paint all the environmentalists with the same broad brush, either." Recycling water rather than discharging it has been a fundamental change for the industry's environmental impact and, as long as the water is

cleaned up enough that it doesn't muck up the works, it's all the same to the drillers. "We could frack with peanut butter, if we had enough of it," Pitzarella says.

**F**RACKING with Skippy never occurred to George Mitchell, the legendary gasman who staked his fortune on the seemingly crackpot idea that you could efficiently get gas out of a rock, but he tried everything else. Range engineer Mark Whitley was with Mitchell in the early days, and still gets a little edge in his voice when he talks about the dicey prospect of having invested about \$1 billion of a company worth only about that much in a technology that nobody thought would work. Noting that President Obama claimed that "it was public research dollars" that made shale extraction possible, he laughs without mirth, and looks like he wants to spit: "Not true," he says. "We tried everything known to man to get a rock to produce. There's a lot of people who claim to be the father of the Marcellus, but if you didn't put any money in or take any gas out, then what's that? It was industry studies, industry experience, and industry dollars that did this, and we've driven up production more rapidly than anybody thought possible." And it was far from a done deal for years: "We could have thrown in the towel any time during the first ten years, but the one guy who didn't want to quit was the guy in charge: George." (*George*. Not, incidentally, *Barack*.) They tried all sorts of brews to get the shale to give up the gas, and, as the expenses mounted, they tried cheaper and cheaper alternatives, eventually settling on the low-tech combination of water and sand that turned out to be the thing that actually works. "Economics drove it," Whitley says.

The gas guys scoff at President Obama's claim that federal ingenuity produced the shale boom, and they scoff harder at their rivals' occasional pleas for government handouts, notably T. Boone Pickens's plan to have the government require long-haul trucks to convert to natural gas and then have taxpayers pick up the bill for it. "The best thing the federal government can do is stay out of our way," Whitley says. "Leave us alone, and we are happy. We are well and appropriately regulated by the state."

Practically everybody in the industry speaks well, if sometimes begrudgingly, of Pennsylvania's department of environmental protection, which, after being caught flat-footed in the early days of the shale revolution, has gotten with the program in a big way. It's undergone a major overhaul of its regulatory regime, and by most measures Pennsylvania's gas industry is cleaner and safer today than in the pre-fracking era. Billions of dollars rolling in, and thousands of new jobs, and much more on the line in the future, will do that. And the industry, while not always entirely in love with the DEP and its colonoscopic minions, appreciates that its Pennsylvania regulators understand the practices and geology of Pennsylvania in a way that faraway regulators at the EPA would not. If the EPA—especially Barack Obama's highly politicized EPA—gets involved, the result is likely to be arbitrary national standards. "The feds only screw things up," says one engineer, and any reasonable federal regulatory regime would end up essentially replicating most or all of what the states already are doing, but at a political distance that makes regulators more remote and less accountable. When it comes to fracking for gas, facts on the ground are facts literally *in* the ground. Keeping regulation at the state level is the top political priority in the Marcellus, so the industry has an interest in making the DEP look good: It's that

compliance-vs.-high compliance thing again, naked self-interest producing virtuous outcomes. Range regularly has the DEP out to its facilities to show them the latest and greatest, with the unspoken suggestion that what it does voluntarily everybody else in THE PLAY should do voluntarily, too, because voluntarily accepted best practices are the only real political insurance against involuntarily accepted second-best (or worse) practices: *Let's do it right before the feds make us do it wrong.*

DEP spokesman Kevin Sunday encourages that line of thinking: "Pennsylvania has a unique and diverse geology, and that's why states should have the primacy in regulating this instead of the one-size-fits-all approach that some in the federal government would prefer to see." He says that water recycling has represented a "sea change" in the industry. "Some are recycling at 100 percent—it depends on what you're drilling through. The average is 70, 75 percent." Higher standards for discharged water have made it more attractive to recycle, too, with many facilities required to treat water to the state's standard for potable drinking water before putting it into streams or rivers. That's a sneaky little trick: Once the water has been cleaned up enough to discharge, nobody wants to discharge it. "If you get it down to that standard, it's too valuable to flush it down the toilet," Sunday says.

Which is to say that in the Marcellus they have discovered, along with enormous quantities of gas, that rarest of commodities: a regulatory success story.

**T**HERE is no doubt that drilling wastewater is highly polluted," says Hanger, the former DEP secretary. "Prior to the Marcellus, when the Pennsylvania industry was small, we were dumping drilling wastewater untreated into rivers and streams and hoping that dilution would keep concentrations below levels that would cause damage to aquatic life or drinking water. There is probably less water going untreated into the rivers today than before the first Marcellus well. It's a success story. If you look at the top ten things impacting water in Pennsylvania right now, the gas industry would not be on the list, and certainly not fracking. Industry, environmentalists, and regulators all ought to be celebrating. But there's money to be made out of fighting."

All of which is perplexing to the boy geniuses in the fracking command centers scattered around Pennsylvania. Talking politics with engineers is dancing about architecture—they just don't get it, and they get frustrated. "We have all this wealth in the ground," says one of the bespectacled brethren, "and we can get it out. We can do it efficiently and cleanly"—and we have giant frackin' robots!—"but some people don't want us to. They just don't like it." Laying out this scenario, he wears a look that is four parts non-plussed and one part hurt. You want to hand the kid an Ayn Rand novel with the good parts dog-eared.

Nothing happens in a vacuum, political or environmental, even a mile under the rock. And the real question about fracking, as Hanger points out, isn't fracking vs. some Platonic energy ideal. It's between fracking and coal, or, to a lesser extent, between fracking and oil.

Walking around finished gas wells in THE PLAY, you'll notice a weird thing: A lot of them run off of solar power. There's no utility power in some of the more remote areas, and it's more efficient to put up some solar panels to run the monitoring equipment and the other gear necessary to keep a producing well producing. And in the remote Texas panhandle, Valero operates a major oil refin-

ery that's attached to a 5,000-acre wind farm, being located in the sweet spot of having lots of crude pipelines, lots of wind, lots of real estate, and not very many people. When it's operating at its peak, the wind farm produces enough juice to run the whole refinery—but it takes a lot of turbines and a lot of West Texas wind to get that done when you have the capacity to refine 170,000 barrels of crude a day. The wind farm isn't a PR stunt, Valero insists: It's economical, and beyond wind Valero has a pretty good-sized portfolio of investments in alternative energy, from ethanol to algae. But consumers and policymakers should understand the limitations of those technologies, a Valero spokesman says: "We get frustrated by this idea that cars should run on sunshine and happy thoughts." But cars can and do run on natural gas, and the surge in U.S. oil and gas production has made American firms more competitive with their overseas rivals and has led to a renaissance among local refineries.

Given all that, the data are on the side of fracking. But the political momentum is on the other side. It remains likely that the EPA will take its heavy hand to the industry, a development for which the enviro-Left, led by Occupy Wall Street, is positively howling, which is frustrating for environmentalists such as John Hanger. "If there's no fracking, the unavoidable consequence would be a sharp increase in oil and coal consumption. Even if environmental and public-health issues were your only concerns—leave aside national security and the economic impacts—that fact alone should give you some pause."

**B**UT don't bother with *evidence*: The opposition to fracking isn't at its heart environmental or economic or scientific. It's ideological, and that ideology is *nihilism*. Environmentalism is a movement that began with the fire on the Cuyahoga River in 1969 and a few brief years later had mutated into the Voluntary Human Extinction Movement (motto: "MAY WE LIVE LONG AND DIE OUT!"), which maintains: "Phasing out the human race by voluntarily ceasing to breed will allow Earth's biosphere to return to good health. Crowded conditions and resource shortages will improve as we become less dense." (Good luck with that "less dense" thing, geniuses.)

Benign environmentalists are opposed to pollution, as all sensible people are; malign environmentalists are opposed to energy and most of what it enables. Their enemy isn't drilling rigs and ethane crackers and engineers and their technological marvels: Their enemy is the kind of civilization that makes such feats and wonders possible, the fact that a smart guy with a big idea can make a hole in the ground and summon up power from the vasty deep. Their enemy is *us*. We can debate best drilling practices, appropriate emissions regulation, wastewater-disposal techniques—the engineering stuff—and even hare-brained ideas like the Pickens plan.

But we can't really debate the course of modern technological civilization with people who are opposed to modern technological civilization per se, your mostly middle-class and expensively miseducated (and forgive me for noticing but your overwhelmingly *white*) types afflicted with the ennui of affluence, who suddenly take a fancy to the idea that life might be lived more authentically with a bone in one's nose and a trip to the neighborhood shaman—the shaman who might, if the spirits smile upon him, initiate you into the ancient mysteries of the burning spring.

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# Getting to Know SUSANA

*A visit with the governor of New Mexico,  
Susana Martinez, after her first year in office*

BY JAY NORDLINGER

*Santa Fe, N.M.*

**I**N her spacious office on the top floor of the "Roundhouse," as the state capitol is called, Governor Susana Martinez greets a group of schoolchildren. Excitedly, they have their picture taken with her. As they leave, she calls out to them, "Be good!" One of the teachers answers, "You too!" She says, "I'm trying my best, every day." After they leave, the governor says how enjoyable it is to meet and mingle with happy schoolchildren: It's one of the nicest parts of her job. In her former job, as a district attorney, she often met with children who were far from happy: They were victims of crime. She has seen a lot in her career, as prosecutors and other law-enforcement people tend to.

Susana Martinez was elected governor of New Mexico in 2010. For those keeping score, she is the first Hispanic woman to be the governor of any state. A conservative Republican, she is a star of her party, nationally. There is even talk that she should be the vice-presidential nominee this year. She has said, firmly, that she wouldn't accept the position: She is committed to her state and her term. Besides which, you could say, it's way too early for Martinez to be on a national ticket: She has had just a year as governor. Still, you can forgive Republicans their excitement over this woman, whose gifts and appeal are undeniable.

She was born in El Paso, Texas, in 1959, and she was raised in that city too. Her father was a Marine, a Golden Gloves boxing champion, a deputy sheriff, and, finally, a businessman. One of the governor's great-grandfathers was Toribio Ortega, a general in the Mexican Revolution. When in high school, she was the student-council president. She went to the University of Texas at El Paso, and then to the University of Oklahoma College of Law. Why did she go to law school? When she was a child, she noticed that congressmen and senators tended to be lawyers. She herself was interested in a life of politics and public service. She never had a doubt that she would go to law school.

Her parents were Democrats, she was a Democrat, and so was just about everyone they knew. But the Martinezes were conservatives. The future governor was raised very strictly, she says, with her parents emphasizing education and hard work. She and her brother went to Catholic schools. She had the great responsibility of helping to care for her sister, who was "special needs," as she says: She bathed her, slept with her, and so on. Then, too, there was the fact that her parents were running a business. It was a security-guard company, which began with three employees: Mom, Dad, and Susana. Her parents realized, she says, "how much of their own capital they needed to keep in order to go after the next contract." They also realized how jobs were created. Eventually, the company grew to 125 employees in three states.