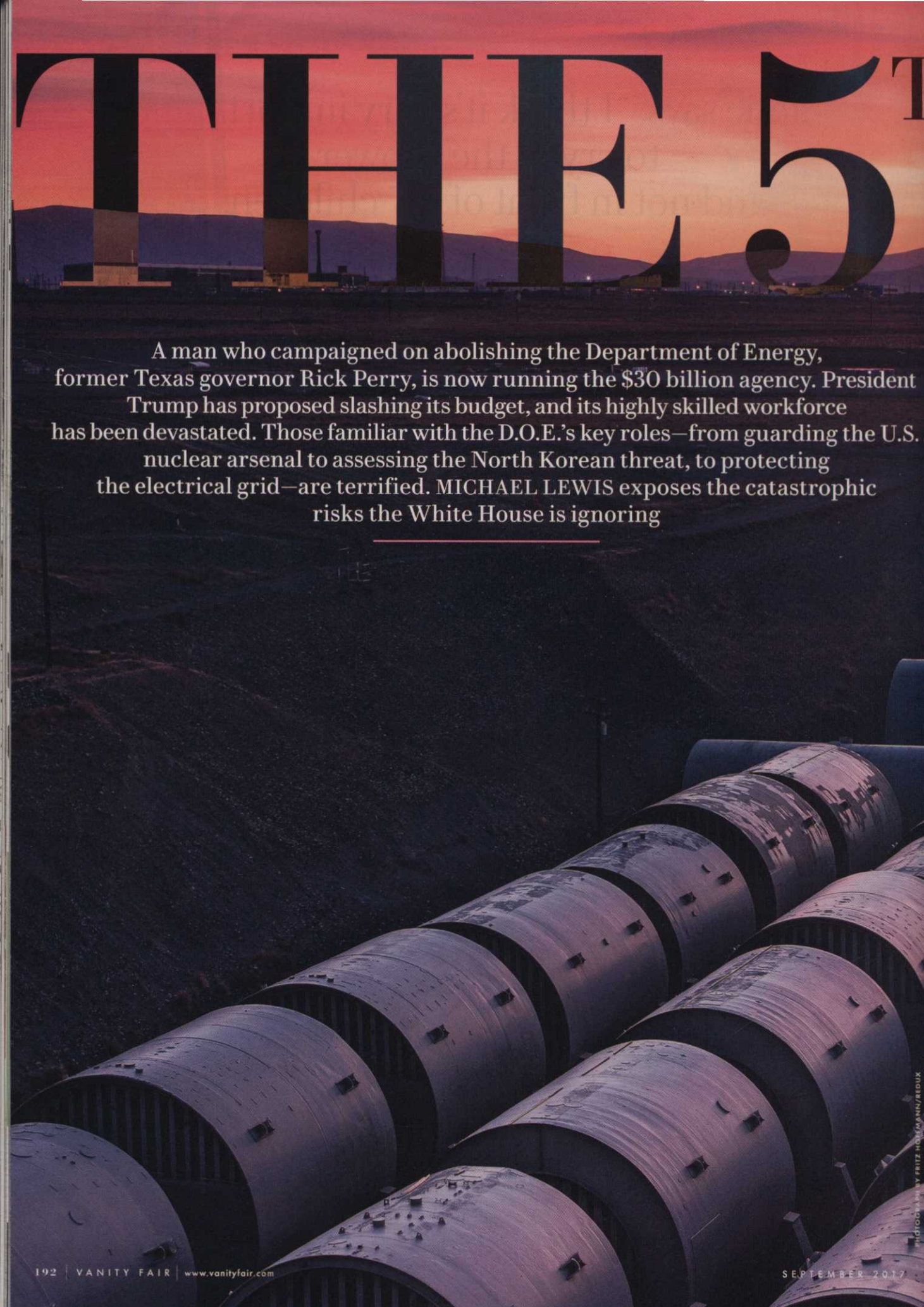
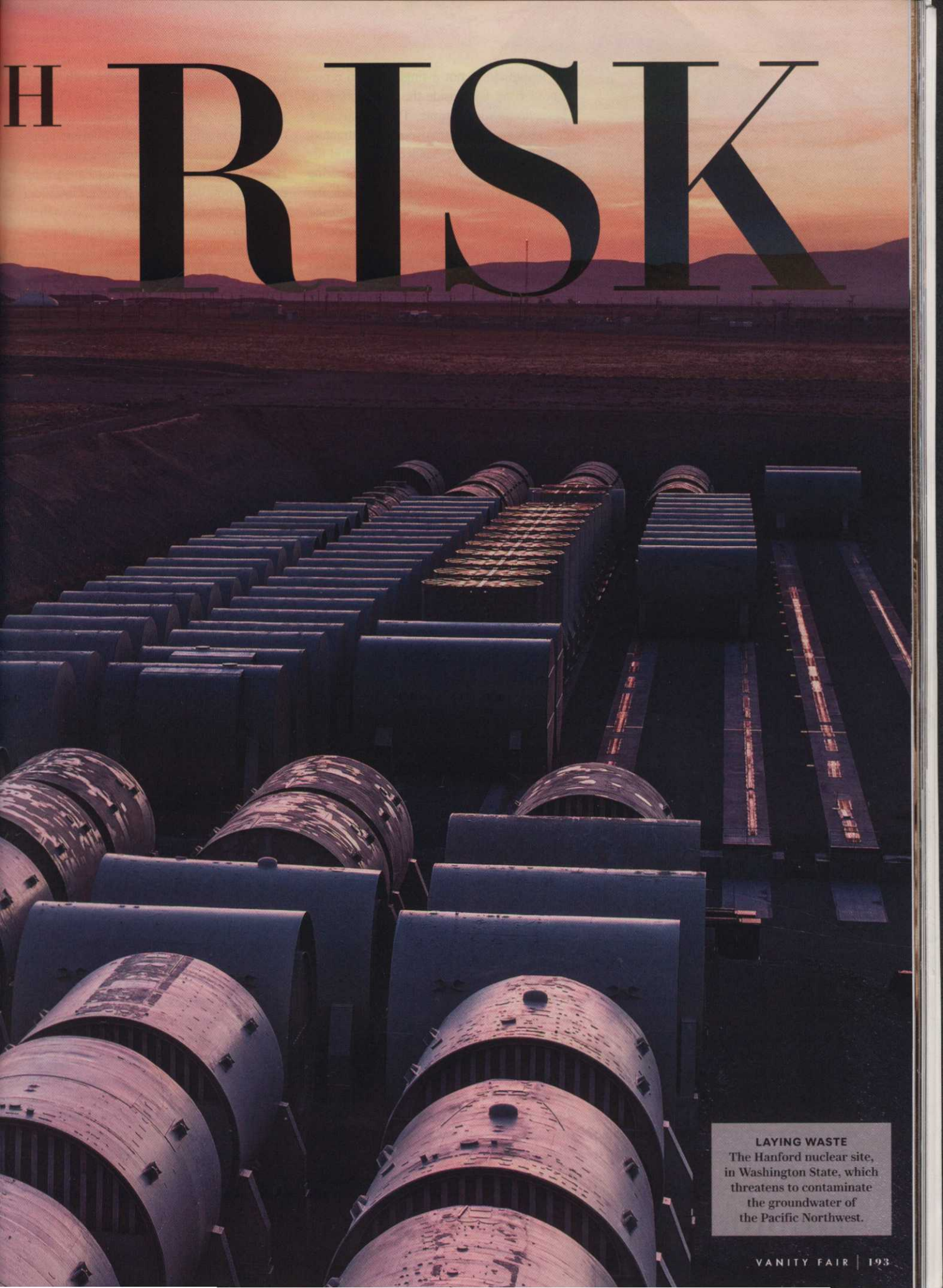


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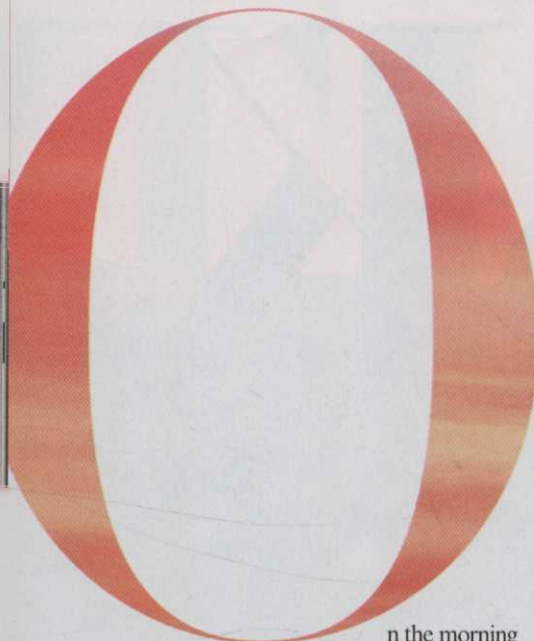
A man who campaigned on abolishing the Department of Energy, former Texas governor Rick Perry, is now running the \$30 billion agency. President Trump has proposed slashing its budget, and its highly skilled workforce has been devastated. Those familiar with the D.O.E.'s key roles—from guarding the U.S. nuclear arsenal to assessing the North Korean threat, to protecting the electrical grid—are terrified. MICHAEL LEWIS exposes the catastrophic risks the White House is ignoring

H RISK



LAYING WASTE

The Hanford nuclear site, in Washington State, which threatens to contaminate the groundwater of the Pacific Northwest.



n the morning after the election, November 9, 2016, the people who ran the U.S. Department of Energy turned up in their offices and waited. They had cleared 30 desks and freed up 30 parking spaces. They didn't know exactly how many people they'd host that day, but whoever won the election would surely be sending a small army into the Department of Energy, and every other federal agency. The morning after he was elected president, eight years earlier, Obama had sent between 30 and 40 people into the Department of Energy. The Department of Energy staff planned to deliver the same talks from the same five-inch-thick three-ring binders, with the Department of Energy seal on them, to the Trump people as they would have given to the Clinton people. "Nothing had to be changed," said one former Department of Energy staffer. "They'd be done always with the intention that, either party wins, nothing changes."

By afternoon the silence was deafening. "Day 1, we're ready to go," says a former senior White House official. "Day 2 it was 'Maybe they'll call us?'"

"Teams were going around, 'Have you heard from them?'" recalls another staffer who had prepared for the transition. "'Have you gotten anything? I haven't got anything.'"

"The election happened," remembers Elizabeth Sherwood-Randall, then deputy secretary of the D.O.E. "And he won. And then there was radio silence. We were prepared for *the next day*. And nothing happened." Across the federal government the Trump people weren't anywhere to be found. Allegedly, between the election and

the inauguration not a single Trump representative set foot inside the Department of Agriculture, for example. The Department of Agriculture has employees or contractors in every county in the United States, and the Trump people seemed simply to be ignoring the place. Where they did turn up inside the federal government, they appeared confused and unprepared. A small group attended a briefing at the State Department, for instance, only to learn that the briefings they needed to hear were classified. None of the Trump people had security clearance—or, for that matter, any experience in foreign policy—and so they weren't allowed to receive an education. On his visits to the White House soon after the election, Trump's son-in-law, Jared Kushner, expressed surprise that so much of its staff seemed to be leaving. "It was like he thought it was a corporate acquisition or something," says an Obama White House staffer. "He thought everyone just stayed."

Even in normal times the people who take over the United States government can be surprisingly ignorant about it. As a longtime career civil servant in the D.O.E., who has watched four different administrations show up to try to run the place, put it, "You always have the issue of maybe they don't understand what the department does." To address that problem, a year before he left office, Barack Obama had instructed a lot of knowledgeable people across his administration, including 50 or so inside the D.O.E., to gather the knowledge that his successor would need in order to understand the government he or she was taking charge of. The Bush administration had done the same for Obama, and Obama had always been grateful for their efforts. He told his staff that their goal should be to ensure an even smoother transfer of power than the Bush people had achieved.

That had proved to be a huge undertaking. Thousands of people inside the federal government had spent the better part of a year drawing a vivid picture of it for the benefit of the new administration. The United States government might be the most complicated organization on the face of the earth. Two million federal employees take orders from 4,000 political appointees. Dysfunction is baked into the structure of the thing: the subordinates know that their bosses will be replaced every four or eight years, and that the direction of their enterprises might change overnight—with an election or a war or some other political event. Still, many of the prob-

lems our government grapples with aren't particularly ideological, and the Obama people tried to keep their political ideology out of the briefings. "You don't have to agree with our politics," as the former senior White House official put it. "You just have to understand how we got here. Zika, for instance. You might disagree with how we approached it. You don't have to agree. You just have to understand why we approached it that way."

How to stop a virus, how to take a census, how to determine if some foreign country is seeking to obtain a nuclear weapon or if North Korean missiles can reach Kansas City: these are enduring technical problems. The people appointed by a newly elected president to solve these problems have roughly 75 days to learn from their predecessors. After the inauguration, a lot of deeply knowledgeable people will scatter to the four winds and be forbidden, by federal law, from initiating any contact with their replacements. The period between the election and the inauguration has the feel of an A.P. chemistry class to which half the students have turned up late and are forced to scramble to grab the notes taken by the other half, before the final. "It's a source of a lot of the dysfunction in government," says Max Stier, who runs the nonpartisan Partnership for Public Service, which, over the past decade, has become perhaps the world's expert on U.S. presidential transitions. "The wheel comes off the bus at the start of the trip and you never get anywhere."

Two weeks after the election the Obama people inside the D.O.E. read in the newspapers that Trump had created a small "Landing Team."

According to several D.O.E. employees, this was led by, and mostly consisted of, a man named Thomas Pyle, president of the American Energy Alliance, which, upon inspection, proved to be a Washington, D.C., propaganda machine funded with millions of dollars from ExxonMobil and Koch Industries. Pyle himself had served as a Koch Industries lobbyist and ran a side business writing editorials attacking the D.O.E.'s attempts to reduce the dependence of the American economy on carbon. Pyle says that his role on the Landing Team was "voluntary," adding that he could not disclose who appointed him, due to a confidentiality agreement. The people running the D.O.E. were by then seriously alarmed. "We first learned of Pyle's appoint-

Trump's people "mainly ran around the building

The James V. Forrestal Building, home of the Department of Energy, in Washington, D.C.

DEPARTMENT OF ENERGY

ment on the Monday of Thanksgiving week," recalls D.O.E. chief of staff Kevin Knobloch. "We sent word to him that the secretary and his deputy would meet with him as soon as possible. He said he would like that but could not do it until after Thanksgiving."

A month after the election Pyle arrived for a meeting with Energy Secretary Ernest Moniz, Deputy Secretary Sherwood-Randall, and Knobloch. Moniz is a nuclear physicist, then on leave from M.I.T., who had served as deputy secretary during the Clinton administration and is widely viewed, even by many Republicans, as understanding and loving the D.O.E. better than any person on earth. Pyle appeared to have no interest in anything he had to say. "He did not seem motivated to spend a lot of time to understanding the place," says Sherwood-Randall. "He didn't bring a pencil or a piece of paper. He didn't ask questions. He spent an hour. That was it. He never asked to meet with us again." Afterward, Knobloch says, he suggested that Pyle visit one day each week until the inauguration, and that Pyle

agreed to do it—but then he never showed up, instead attending a half-dozen meetings or so with others. "It's a head-scratcher," says Knobloch. "It's a \$30-billion-a-year organization with about 110,000 employees. Industrial sites across the country. Very serious stuff. If you're going to run it, why wouldn't you want to know something about it?"

There was a reason Obama had appointed nuclear physicists to run the place: it, like the problems it grappled with, was technical and complicated. Moniz had helped lead the U.S. negotiations with Iran precisely because he knew which parts of their nuclear-energy program they must surrender if they were to be prevented from obtaining a nuclear weapon. For a decade before Knobloch joined the D.O.E., in June 2013, he had served as president of the Union of Concerned Scientists. "I had worked closely with D.O.E. throughout my career," he says. "I

thought I knew and understood the agency. But when I came in I thought, Holy cow."

Deputy Secretary Elizabeth Sherwood-Randall has spent her 30-year career working on reducing the world's supply of weapons of mass destruction—she led the U.S. mission to remove chemical weapons from Syria. But like everyone else who came to work at the D.O.E., she'd grown accustomed to no one knowing what the department actually did. When she'd called home, back in 2013, to tell them that President Obama had nominated her to be second-in-command of the place, her mother said, "Well, darling, I have no idea what the Department of Energy does, but you've always had a lot of energy, so I'm sure you'll be perfect for the role."

The Trump administration had no clearer idea what she did with her day than her mother. And yet, according to Sherwood-Randall, they were certain they didn't need to hear anything she had to say before they took over her job.

Pyle, according to D.O.E. officials, eventu-

insulting people," says a former Obama official.

“The risks of mistakes being made and lots of

ally sent over a list of 74 questions he wanted answers to. His list addressed some of the subjects covered in the briefing materials, but also a few not:

Can you provide a list of all Department of Energy employees or contractors who have attended any Interagency Working Group on the Social Cost of Carbon meetings?

Can you provide a list of Department employees or contractors who attended any of the Conference of the Parties (under the United Nations Framework Convention on Climate Change) in the last five years?

That, in a nutshell, was the spirit of the Trump enterprise. “It reminded me of McCarthyism,” says Sherwood-Randall.

It says a great deal about the mind-set of career civil servants that the D.O.E. employee in charge of overseeing the transition set out to answer even the most offensive questions. Her attitude, like the attitude of the permanent staff, was *We are meant to serve our elected masters, however odious they might be*. “When the questions got leaked to the press, she was really upset,” says the former D.O.E.

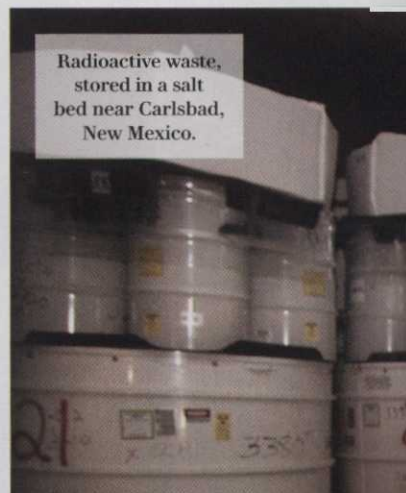
staffer. The only reason that the D.O.E. did not serve up the names of people who had educated themselves about climate change, and thus exposed themselves to the wrath of the new administration, was that the old administration was still in charge: “We aren’t answering these questions,” Secretary Moniz had said, simply.

After Pyle’s list of questions wound up on Bloomberg News, the Trump administration disavowed them, but a signal had been sent: *We don’t want you to help us understand; we want to find out who you are and punish you*. Pyle vanished from the scene. According to a former Obama official, he was replaced by a handful of young ideologues who called themselves “the Beachhead Team.” “They mainly ran around the building insulting people,” says a former Obama official. “There was a mentality that everything that government does is stupid and bad and the people are stupid and bad,” says another. They allegedly demanded to know the names and salaries of the 20 highest-paid people in the national-science labs overseen by the D.O.E. They’d eventually, according to former

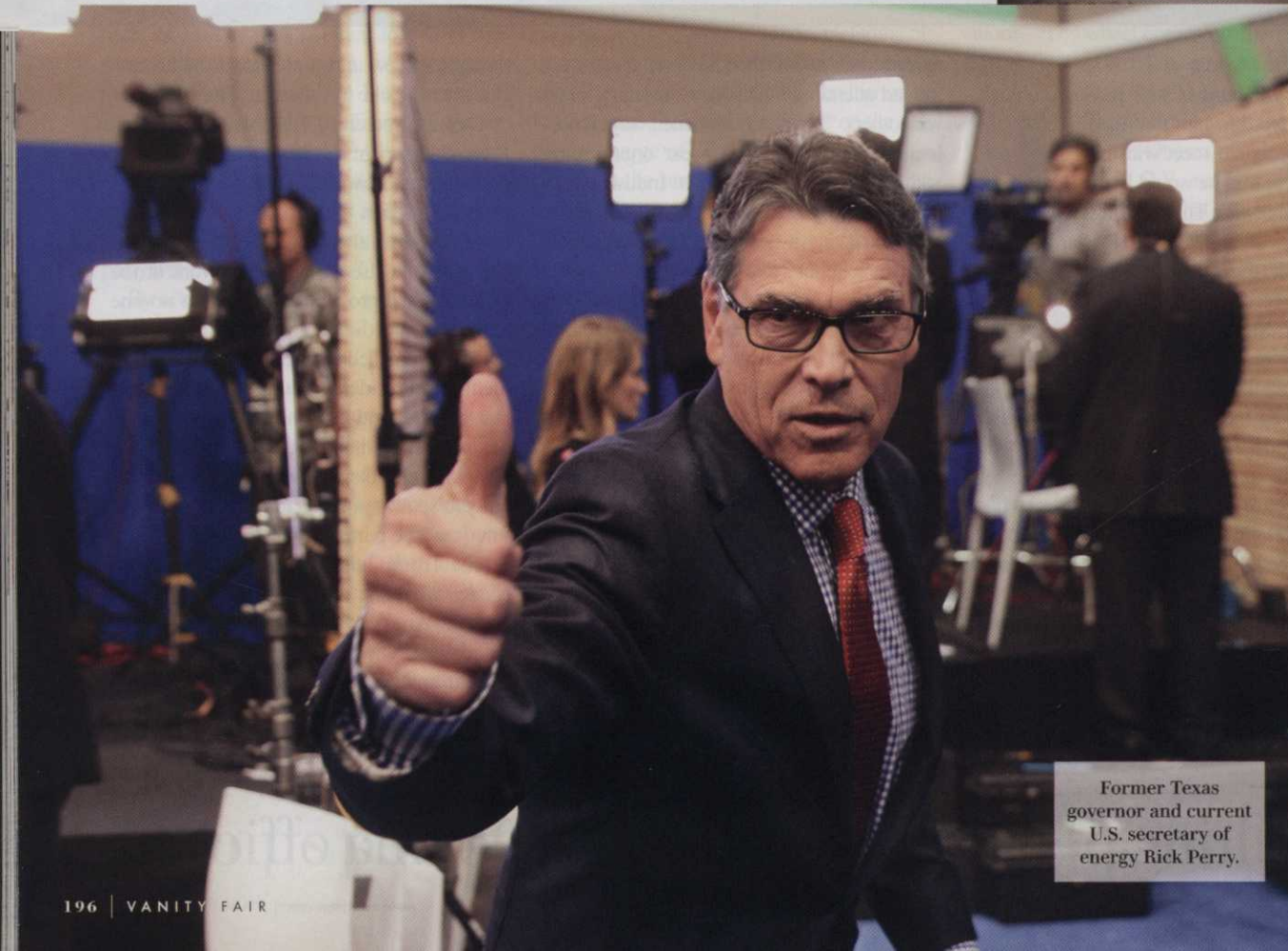
D.O.E. staffers, delete the contact list with the e-mail addresses of all D.O.E.-funded scientists—apparently to make it more difficult for them to communicate with one another. “These people were insane,” says the former D.O.E. staffer. “They weren’t prepared. They didn’t know what they were doing.”

“We had tried desperately to prepare them,” said Tarak Shah, chief of staff for the D.O.E.’s \$6 billion basic-science pro-

Radioactive waste, stored in a salt bed near Carlsbad, New Mexico.



Former Texas governor and current U.S. secretary of energy Rick Perry.



people being killed is increasing dramatically.”

gram. “But that required them to show up. And bring qualified people. But they didn’t. They didn’t ask for even an introductory briefing. Like ‘What do you do?’” The Obama people did what they could to preserve the institution’s understanding of itself. “We were prepared for them to start wiping out documents,” said Shah. “So we prepared a public Web site to transfer the stuff onto it—if needed.”

The one concrete action the Trump administration took before Inauguration Day was to clear the D.O.E. building of anyone appointed by Obama. Even here it exhibited a bizarre ham-handedness. For instance, the Trump White House asked the D.O.E.’s inspector general to resign, along with the inspectors general of the other fed-

eral agencies, out of the mistaken belief that he was an Obama appointee. After members of Congress called to inform the Trump people that the inspectors general were permanent staff, so that they might remain immune to political influence, the Trump people re-installed him.

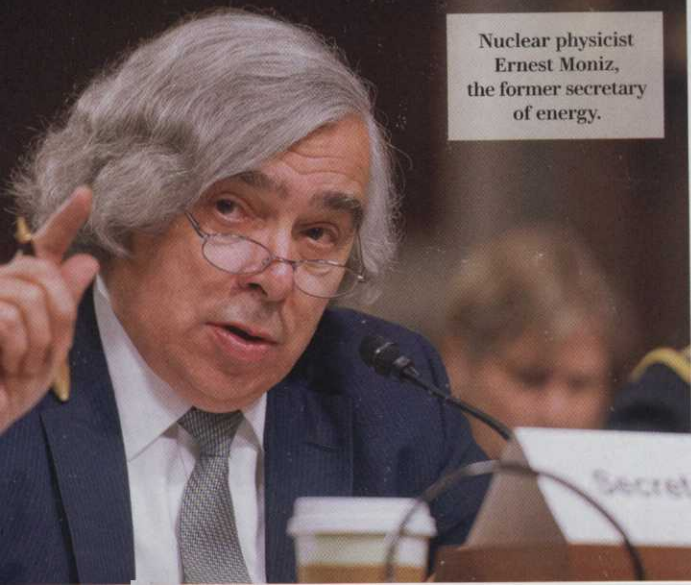
But there was actually a long history of even the appointees of one administration hanging around to help the new appointees of the next. The man who had served as chief financial officer of the department during the Bush administration, for instance, stayed a year and a half into the Obama administration—simply because he had a detailed understanding of the money end of things that was hard to replicate quickly. The C.F.O. of the department at the end of the Obama administration was a mild-mannered civil-servant type named Joe Hezir. He had no particular political identity and was widely thought to have done a good job—and so he half-expected a call from the Trump people asking him to stay on, just to keep the money side of things running smoothly. The call never came. No one even let him know his services were no longer required. Not knowing what else to do, but without anyone to replace him, the C.F.O. of a \$30 billion operation just up and left.

This was a loss. A lunch or two with the chief financial officer might have alerted the new administration to some of the terrifying risks they were leaving essentially unmanaged. Roughly half of the D.O.E.’s annual budget is spent on maintaining and guarding our nuclear arsenal, for instance. Two billion of that goes to hunting down weapons-grade plutonium and uranium at loose in the world so that it doesn’t fall into the hands of terrorists. In just the past eight years the D.O.E.’s National Nuclear Security Administration has collected enough material to make 160 nuclear bombs. The department trains every international atomic-energy inspector; if nuclear power plants around the world are not producing weapons-grade material on the sly by reprocessing spent fuel rods and recovering plutonium, it’s because of these people. The D.O.E. also supplies radiation-detection equipment to enable other countries to detect bomb material making its way across national borders. To maintain the nuclear arsenal, it conducts endless, wildly expensive experiments on tiny amounts of nuclear material to try to understand what is actually happening to plutonium

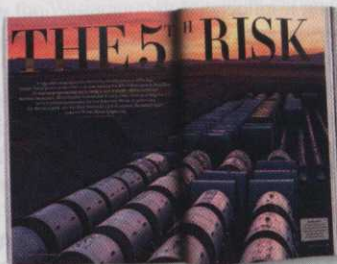
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Nuclear physicist Ernest Moniz, the former secretary of energy.



Department of Energy



CONTINUED FROM PAGE 197 when it fissions, which, amazingly, no one really does. To study the process, it is funding what promises to be the next generation of supercomputers, which will in turn lead God knows where.

The Trump people didn't seem to grasp, according to a former D.O.E. employee, how much more than just energy the Department of Energy was about. They weren't totally oblivious to the nuclear arsenal, but even the nuclear arsenal didn't provoke in them much curiosity. "They were just looking for dirt, basically," said one of the people who briefed the Beachhead Team on national-security issues. "What is the Obama administration not letting you do to keep the country safe?" The briefers were at pains to explain an especially sensitive aspect of national security: the United States no longer tests its nuclear weapons. Instead, it relies on physicists at three of the national labs—Los Alamos, Livermore, and Sandia—to simulate explosions, using old and decaying nuclear materials.

This is not a trivial exercise, and to do it we rely entirely on scientists who go to work at the national labs because the national labs are exciting places to work. They then wind up getting interested in the weapons program. That is, because maintaining the nuclear arsenal was just a by-product of the world's biggest science project, which also did things like investigating the origins of the universe. "Our weapons scientists didn't start out as weapons scientists," says Madelyn Creedon, who was second-in-command of the nuclear-weapons wing of the D.O.E., and who briefed the incoming administration, briefly. "They didn't understand that. The one question they asked was 'Wouldn't you want the guy who grew up wanting to be a weapons scientist?' Well, actually, no."

In the run-up to the Trump inauguration the man inside the D.O.E. in charge of the nuclear-weapons program was required to submit his resignation, as were the department's 137 other political appointees. Frank Klotz was his name, and he was a retired three-star air-force lieutenant general with a Ph.D. in politics from Oxford. The keeper of the nation's nuclear secrets had boxed up most of his books and memorabilia just like everyone else and was on his way out before anyone had apparently

given the first thought to who might replace him. It was only after Secretary Moniz called a few senators to alert them to the disturbing vacancy, and the senators phoned Trump Tower sounding alarmed, that the Trump people called General Klotz, on the day before Donald Trump was inaugurated as the 45th president of the United States, and asked him to bring back the stuff he had taken home and move back into his office. Aside from him, the people with the most intimate knowledge of the problems and the possibilities of the D.O.E. walked out the door.

It was early June when I walked through those same doors, to see what was going on. The D.O.E. makes its home in a long rectangular cinder-block-like building propped up on concrete stilts, just off the National Mall. It's a jarring sight—as if someone had punched out a skyscraper and it never got back on its feet. It's relentlessly ugly in the way the swamps around Newark Airport are ugly—so ugly that its ugliness bends back around into a sneaky kind of beauty: it will make an excellent ruin. Inside, the place feels like a lab experiment to determine just how little aesthetic stimulation human beings can endure. The endless hallways are floored with white linoleum and almost insistently devoid of personality. "Like a hospital, without the stretchers," as one employee put it. But this place is at once desolate and urgent. People still work here, doing stuff that, if left undone, might result in unimaginable death and destruction.

By the time I arrived the first eighth of Trump's first term was nearly complete, and his administration was still, largely, missing. He hadn't nominated anyone to serve as head of the Patent Office, for instance, or to run FEMA. There was no Trump candidate to head the T.S.A., or anyone to run the Centers for Disease Control. The 2020 national census will be a massive undertaking for which there is not a moment to lose and yet there's no Trump appointee in place to run it. "The actual government has not really taken over," says Max Stier. "It's kindergarten soccer. Everyone is on the ball. No one is at their positions. But I doubt Trump sees the reality. Everywhere he goes everything is going to be hunky-dory and nice. No one gives him the bad news."

At this point in their administrations Obama and Bush had nominated their top 10 people at the D.O.E. and installed most of them in their offices. Trump had nominated three people and installed just one, former Texas governor Rick Perry. Perry is of course responsible for one of the D.O.E.'s most famous moments—when in a 2011 presidential debate he said he intended to eliminate three entire departments of the federal government. Asked to list them he named Commerce, Education, and... then hit a wall. "The third agency of government I would do away with... Education... the... ahhhhh... ahhh... Commerce, and let's see."

As his eyes bored a hole in his lectern, his mind drew a blank. "I can't, the third one. I can't. Sorry. Oops." The third department Perry wanted to get rid of, he later recalled, was the Department of Energy. In his confirmation hearings to run the department Perry confessed that when he called for its elimination he hadn't actually known what the Department of Energy did—and he now regretted having said that it didn't do anything worth doing.

The question on the minds of the people who currently work at the department: Does he know what it does now? D.O.E. press secretary Shaylyn Hynes assures us that "Secretary Perry is dedicated to the missions of the Department of Energy." And in his hearings, Perry made a show of having educated himself. He said how useful it was to be briefed by former secretary Ernest Moniz. But when I asked someone familiar with those briefings how many hours Perry had spent with Moniz, he laughed and said, "That's the wrong unit of account." With the nuclear physicist who understood the D.O.E. perhaps better than anyone else on earth, according to one person familiar with the meeting, Perry had spent minutes, not hours. "He has no personal interest in understanding what we do and effecting change," a D.O.E. staffer told me in June. "He's never been briefed on a program—not a single one, which to me is shocking."

Since Perry was confirmed, his role has been ceremonial and bizarre. He pops up in distant lands and tweets in praise of this or that D.O.E. program while his masters inside the White House create budgets to eliminate those very programs. His sporadic public communications have had in them something of the shell-shocked grandmother trying to preside over a pleasant family Thanksgiving dinner while pretending that her blind-drunk husband isn't standing naked on the dining-room table waving the carving knife over his head.

Meanwhile, inside the D.O.E. building, people claiming to be from the Trump administration appear willy-nilly, unannounced, and unannounced to the career people. "There's a mysterious kind of chain from the Trump loyalists who have shown up inside D.O.E. to the White House," says a career civil servant. "That's how decisions, like the budget, seem to get made. Not by Perry." The woman who ran the Obama department's energy-policy analysis unit recently received a call from D.O.E. staff telling her that her office was now occupied by Eric Trump's brother-in-law. Why? No one knew. "Yes, you can notice the difference," says one young career civil servant, in response to the obvious question. "There's a lack of professionalism. They're not very polite. Maybe they've never worked in an office or government setting. It's not hostility so much as a real sense of concern with sharing information with career employees. Because of that lack of communication, nothing is being done."

All policy questions remain unanswered.”

The D.O.E. has a program, for example, to provide low-interest loans to companies to encourage risky corporate innovation in alternative energy and energy efficiency. The loan program became infamous when one of its borrowers, the solar-energy company Solyndra, was unable to repay its loan, but, as a whole, since its inception in 2009, the program has turned a profit. And it has been demonstrably effective: it lent money to Tesla to build its factory in Fremont, California, when the private sector would not, for instance. Every Tesla you see on the road came from a facility financed by the D.O.E. Its loans to early-stage solar-energy companies launched the industry. There are now 35 viable utility-scale, privately funded solar companies—up from zero a decade ago. And yet today the program sits frozen. “There’s no direction what to do with the applications,” says the young career civil servant. “Are we shutting the program down?” They’d rather not, but if that’s what they are going to do, they should do it. “There’s no staff, just me,” says the civil servant. “People keep bugging me for direction. It’s got to the point I don’t care if you tell me to tear the program down. Just tell me what you want to do so I can do it intelligently.” Another permanent employee, in another wing of the D.O.E., says, “The biggest change is the grinding to a halt of any proactive work. There’s very little work happening. There’s a lot of confusion about what our mission was going to be. For a majority of the workforce it’s been demoralizing.”

Over and over again, I was asked by people who worked inside the D.O.E. not to use their names, or identify them in any way, for fear of reprisal. “People are heading for the doors,” says Tarak Shah. “And that’s really sad and destructive. The best and the brightest are the ones being targeted. They will leave fastest. Because they will get the best job offers.”

There might be no time in the history of the country when it was so interesting to know what was going on inside these bland federal office buildings—because there has been no time when those things might be done ineptly, or not done at all. But if you want to know how the D.O.E. works—the problems it manages, the fears that keep its employees awake at night, the things it does you just sort of assume will continue being done—there’s no real point in being inside the D.O.E. Anyone who wants a blunt, open assessment of the risks inherent in the United States government now has to leave it to find it.

The First Risk

By the time I reached John MacWilliams’s kitchen table, in Quogue, Long Island, I knew about as much about the D.O.E. as he had when he’d started there, back in 2013. MacWilliams had spent a lot of his life pursuing and obtaining a place in the world that he actually hadn’t wanted. In the early 1980s, after graduating from Stanford and Harvard

Law School, he took a coveted job at a prestigious New York law firm. Seeing that the action was not in law but in finance he jumped to Goldman Sachs, where, as an investment banker specializing in the energy sector, he rose quickly. Six years into his career as a Goldman banker he realized he didn’t want to be a banker any more than he’d wanted to be a lawyer. He was actually seriously interested in the energy sector—he could see it was on the cusp of a great transformation—but he didn’t particularly care for Wall Street or the effect it was having on him. “One day I looked in the mirror shaving and there was this haggard face and I said, ‘But for the money would you do this?’” What he wanted, he thought, was to be a writer—but when he shared his secret ambition with his Goldman boss, his boss just looked at him pityingly and said, “John, you have to have talent to write a book.” He wasn’t rich at that point—he had a few hundred grand to his name—but, at the age of 35, he quit his Goldman job and set out to be a novelist.

For the next year he wrote the novel he had imagined—*The Fire Dream*, he called it—and, despite the indifference of the publishing industry, he began another one. But while the first story had come naturally to him the second one felt forced. He sensed that he probably didn’t want to be a writer much more than he had wanted to be a lawyer or an investment banker. “The hardest part was admitting to myself in my black blue jeans that I missed my old life,” he said. He set out to raise money for a fund that would invest in energy companies—at which point an editor from Random House called and said he couldn’t get *The Fire Dream* out of his head and regretted having rejected it. MacWilliams sensed absurdity in his situation: he’d already abandoned his literary ambition. “I can’t be a novelist trying to raise an equity fund,” he said, so he stuck his novel back in the drawer and became a founding partner of the Beacon Group, a private investment firm, and also within that group was co-head of a Beacon fund that specifically invested in the energy field. Seven years later he and his partners sold the Beacon Group to JPMorgan Chase for \$500 million.

Along the way he’d come to know a nuclear physicist, Ernie Moniz, who asked him to join an M.I.T. task force to study the future of nuclear power. In early 2013, when Moniz was named energy secretary, he called MacWilliams and asked him to come to Washington with him. “I recruited him because my view was you should collect talent,” says Moniz. “And it’s unusual to have someone willing to work in government who has been so deeply involved in private-sector investment.”

“I always wanted to serve,” says MacWilliams. “It sounds corny. But that’s it.” Still, he was an odd fit. He’d never worked in government and had no political ambition. He thought of himself as “a problem solver” and a “deal guy.” “I’d been investing in energy

since the mid-1980s and never once went to the D.O.E. and didn’t think I needed to,” he said. “I was just wrong.”

In the beginning he spent much of his time bewildered. “Everything was acronyms,” he said. “I understood 20 to 30 percent of what people were talking about.” He set out, aggressively, to educate himself, pulling people from every nook and cranny and making them explain until he understood what they did. “It took me about a year to understand it all,” he said (which raises the question of how long it would take someone who wasn’t so curious). Anyway, he figured out soon enough that the D.O.E., though created in the late 1970s, largely in response to the Arab-oil embargo, had very little to do with oil and had a history that went back much farther than the 1970s. It contained a collection of programs and offices without a clear organizing principle. About half its budget (in 2016 approximately \$30 billion) went to maintaining the nuclear arsenal and protecting Americans from nuclear threats. It sent teams with equipment to big public events—the Super Bowl, for instance—to measure the radiation levels, in hopes of detecting a dirty bomb before it exploded. “They really were doing things to, like, keep New York safe,” said MacWilliams. “These are not hypothetical things. These are actual risks.” A quarter of the budget went to cleaning up all the unholy world-historic mess left behind by the manufacture of nuclear weapons. The last quarter of the budget went into a rattlebag of programs aimed at shaping Americans’ access to, and use of, energy.

There were reasons these things had been shoved together. Nuclear power was a source of energy, and so it made sense, sort of, for the department in charge of nuclear power also to have responsibility for the weapons-grade nuclear materials—just as it sort of made sense for whoever was in charge of weapons-grade uranium and plutonium to be responsible for cleaning up the mess they made. But the best argument for shoving together the Manhattan Project with nuclear-waste disposal with clean-energy research was that underpinning all of it was Big Science—the sort of scientific research that requires multi-billion-dollar particle accelerators. The D.O.E. ran the 17 national labs—Brookhaven, the Fermi National Accelerator Lab, Oak Ridge, the Princeton Plasma Physics Lab, and so on. “The office of science in D.O.E. is not the office of science for D.O.E.,” said MacWilliams. “It’s the office of science for all science in America. I realized pretty quickly that it was the place where you could work on the two biggest risks to human existence, nuclear weapons and climate change.”

He was surprised—a little shocked even—by the caliber of the civil servants working on these problems. “This idea that government is full of these bureaucrats who are overpaid and not doing anything—I’m sure that in the bowels of some of these places you could find

Department of Energy

people like that," he said. "But the people I got to work with were so impressive. It's a military-like culture." Federal employees tended to be risk-averse, the sort of people who carry an umbrella around all day when there's a 40 percent chance of rain. But, then, sometimes, they weren't. In 2009, during the chaos of Libya's bloody civil war, a young woman who worked for him went into the country with Russian security forces and removed highly enriched uranium. The brainpower still willing to enter public service also surprised him. "There were physicists everywhere. Guys whose ties don't match their suits. Passive nerds. Guys who build bridges."

Ernie Moniz had wanted MacWilliams to evaluate the D.O.E.'s financial risks—after all, that's what he'd done for most of his career—but also, as Moniz put it, to "go beyond financial risks to all the other risks that weren't being properly evaluated." To that end Moniz eventually created a position for MacWilliams that had never existed: chief risk officer. As the D.O.E.'s first-ever chief risk officer, MacWilliams had access to everything that went on inside of it and a bird's-eye view of it all. "With a very complex mission and 115,000 people spread out across the country, shit happens every day," said MacWilliams. Take the project to carve football-field-length caverns inside New Mexico salt beds to store radioactive waste, at the so-called WIPP (Waste Isolation Pilot Plant) facility. The waste would go into barrels and the barrels would go into the caverns, where the salt would eventually entomb them. The contents of the barrels were volatile and so needed to be seasoned with, believe it or not, kitty litter. Three years ago, according to a former D.O.E. official, a federal contractor in Los Alamos, having been told to pack the barrels with "inorganic kitty litter," had scribbled down "an organic kitty litter." The barrel with organic kitty litter in it had burst and spread waste inside the cavern. The site was closed for three years, significantly backing up nuclear-waste disposal in the United States and costing \$500 million to clean, while the contractor claimed the company was merely following procedures given to it by Los Alamos.

The list of things that might go wrong inside the D.O.E. was endless. The driver of a heavily armed unit assigned to move plutonium around the country was pulled over, on the job, for drunken driving. An 82-year-old nun, along with others, cut through the perimeter fence of a facility in Tennessee that housed weapons-grade nuclear material. A medical facility ordered a speck of plutonium for research, and a weapons-lab clerk misplaced a decimal point and FedExed the researchers a chunk of the stuff so big it should have been under armed guard—whereupon horrified medical researchers tried to FedEx it back. "At D.O.E. even the

regular scheduled meetings started with 'You're not going to believe this,'" says former chief of staff Kevin Knobloch.

In his four years on the job MacWilliams had come to understand the D.O.E.'s biggest risks, the way a corporate risk officer might understand the risks inside a company, and had catalogued them for the next administration. "My team prepared its own books. They were never given to anybody. I never had a chance to sit with [the Trump people] and tell them what we're doing, even for a day. And I'd have done it for weeks. I think this was a sad thing. There are things you want to know that would keep you up at night. And I never talked to anyone about them."

It's been five months since he left government service, and I'm the first person to ask him what he knows. Still, I think it is important, as I pull my chair in to his kitchen table, to conduct the briefing in the spirit the Trump people might have approached it—just to see how he could have helped even those who thought they didn't need his help. I assume the tone and manner befitting a self-important, mistrustful person newly arrived from some right-wing think tank. And so I wave my hand over his thick briefing books and say, "Just give me the top five risks I need to worry about *right away*. Start at the top."

Right away we have a problem. At the very top of his list is an accident with nuclear weapons, and it is difficult to discuss that topic with someone who doesn't have security clearance. But the Trump people didn't have it, either, I point out, so he'll just need to work around it. "I have to be careful here," he says. He wants to make a big point: the D.O.E. has the job of ensuring that nuclear weapons are not lost or stolen, or at the slightest risk of exploding when they should not. "It's a thing Rick Perry should worry about every day," he says.

"Are you telling me that there have been scares?"

He thinks a moment. "They've never had a weapon that has been lost," he says carefully. "Weapons have fallen off planes." He pauses again. "I would encourage you to spend an hour reading about Broken Arrows."

"Broken Arrow" is a military term of art for a nuclear accident that doesn't lead to a nuclear war. MacWilliams has had to learn all about these. Now he tells me about an incident that occurred back in 1961, and was largely declassified in 2013, just as he began his stint at D.O.E. A pair of four-mega-ton hydrogen bombs, each more than 250 times more powerful than the bomb that destroyed Hiroshima, broke off a damaged B-52 over North Carolina. One of the bombs disintegrated upon impact, but the other floated down beneath its parachute and armed itself. It was later found in a field outside Goldsboro, North Carolina, with three of its four safety mechanisms tripped or rendered ineffective by the plane's breakup. Had the fourth switch

flipped, a vast section of eastern North Carolina would have been destroyed, and nuclear fallout might have descended on Washington, D.C., and New York City.

"The reason it's worth thinking about this," says MacWilliams, "is the reason that bomb didn't go off was [because of] all the safety devices on the bombs, designed by what is now D.O.E."

The Department of Energy, he continues, spends a lot of time and money trying to make bombs less likely to explode when they are not meant to explode. A lot of the work happens in a drab building with thick concrete walls at the Lawrence Livermore laboratory, in Northern California—one of the three nuclear-weapons research sites funded and supervised by the D.O.E. There a nice mild-mannered man will hand you a softball-size chunk of what seems to be a building material and ask you to guess what it is. And you might guess it is about \$10 worth of ersatz marble from Home Depot. But under certain conditions what appears to be Home Depot marble becomes an explosive powerful enough to trigger a chain reaction in a pile of plutonium. The secret that the mild-mannered man would get thrown in jail for sharing is how you set it off.

That was another thing that had surprised MacWilliams when he went to work at the D.O.E.: the sheer amount of classified information. You couldn't really function without being cleared to hear it. There were places in the building where you could share national secrets, and places where you could not. The people from the F.B.I. who had vetted him for his security clearance had made it very clear that they would excuse many foibles—affairs, petty crimes, drug use—but they could not excuse even the most trivial deception. They asked a battery of questions on the order of "Have you ever known anyone who has advocated the violent overthrow of the United States government?" They'd asked him to list every contact with foreigners he had had in the past seven years, which was absurd, as he had spent a career in global finance and lived in both London and Paris. But the people who handed out security clearances failed to see the humor in it. They wanted to know everything. There was no way anyone who obtained a security clearance would find it not worth mentioning that, say, he'd recently dined with the Russian ambassador.

Sitting at his kitchen table with me, MacWilliams picks up his cell phone. "We're a major target of espionage," he says. "You just have to assume that you are being monitored all the time." I look around. We're surrounded by a lot of green Long Island tranquility.

"Who by?" I say with what I hope is a trace of scorn.

"The Russians. The Chinese."

"How?"

"Every phone I have. Every computer."

Outside, on his back lawn, overlooking a

lovely estuary, MacWilliams had placed silhouettes of wild beasts to deter Canada geese from landing. I laugh.

"You seriously think someone might be listening to us right now?"

"I may have dropped off their radar," he says. "But you are definitely monitored while you are there."

I check my watch. I have important op-eds to write, and perhaps a few meetings with people who might know people who might know the Koch brothers. If I'm a Trump person I'm going to assume the people in charge of the nuclear weapons are sufficiently alive to the risks around them that they don't need Rick Perry's help. After all, the only thing Trump had to say publicly about Rick Perry during the campaign was that he "should be forced to take an I.Q. test" and that "he put glasses on so people think he's smart."

Risks Two and Three

What's the second risk on your list?," I ask.

"North Korea would be up there," says MacWilliams.

Why do I, as an incoming official at the D.O.E., need to be worried about North Korea? MacWilliams explains, patiently, that there lately have been signs that the risk of some kind of attack by North Korea is increasing. The missiles the North Koreans have been firing into the sea are not the absurd acts of a lunatic mind but experiments. Obviously, the D.O.E. is not the only agency inside the U.S. government trying to make sense of these experiments, but the people inside the national labs are the world's most qualified to determine just what North Korea's missiles can do. "For a variety of reasons the risk curve has changed," says MacWilliams guardedly. "The risks of mistakes being made and lots of people being killed is increasing dramatically. It wouldn't necessarily be a nuclear weapon they might deliver. It could be sarin gas."

As he doesn't want to go into further detail and maybe divulge information I am not cleared to hear, I press him to move on. "O.K., give me the third risk on your list."

"This is in no particular order," he says with remarkable patience. "But Iran is somewhere in the top five." He'd watched Secretary Moniz help negotiate the deal that removed from Iran the capacity to acquire a nuclear weapon. There were only three paths to a nuclear weapon. The Iranians might produce enriched uranium—but that required using centrifuges. They might produce plutonium—but that required a reactor that the deal had dismantled and removed. Or they might simply go out and buy a weapon on the open market. The national labs played a big role in policing all three paths. "These labs are incredible national resources, and they are directly responsible for keeping us safe," said MacWilliams. "It's because of them that we can say with absolute certainty that Iran

cannot surprise us with a nuclear weapon." After the deal was done, U.S. Army officers had approached D.O.E. officials to thank them for saving American lives. The deal, they felt sure, had greatly lessened the chance of yet another war in the Middle East that the United States would inevitably be dragged into.

At any rate, the serious risk in Iran wasn't that the Iranians would secretly acquire a weapon. It was that the president of the United States would not understand his nuclear scientists' reasoning about the unlikelihood of the Iranians' obtaining a weapon, and that he would have the United States back away foolishly from the deal. Released from the complicated set of restrictions on its nuclear-power program, Iran would then build its bomb. It wasn't enough to have the world's finest forensic nuclear physicists. Our political leaders needed to be predisposed to listen to them and equipped to understand what they say.

Yeah, well, never mind science—we'll deal with Iran, I could hear some Trump person thinking to himself.

Risk Four

By early summer I had spoken with 20 or so of the people who had run the department, along with a handful of career people. All of them understood their agency as a powerful tool for dealing with the most alarming risks facing humanity. All thought the tool was being badly mishandled and at risk of being busted. They'd grown used to the outside world not particularly knowing, or caring, what they did—unless they screwed up. At which point they became the face of government waste or stupidity. "No one notices when something goes right," as Max Stier put it to me. "There is no bright-spot analysis." How can an organization survive that stresses and responds only to the worst stuff that happens inside it? How does it encourage more of the best stuff, if it doesn't reward it?

The \$70 billion loan program that John MacWilliams had been hired to evaluate was a case in point. It had been authorized by Congress in 2005 to lend money, at very low interest rates, to businesses so that they might develop game-changing energy technologies. The idea that the private sector under-invests in energy innovation is part of the origin story of the D.O.E. "The basic problem is that there is no constituency for an energy program," James Schlesinger, the first secretary of energy, said as he left the job. "There are many constituencies opposed." Existing energy businesses—oil companies, utilities—are obviously hostile to government-sponsored competition. At the same time they are essentially commodity businesses, without a lot of fat in them. The stock market does not reward even big oil companies for research and development that will take decades to pay off. And the sort of research that might lead to huge changes in energy production often doesn't pay off for decades. Plus it requires a lot of expen-

sive science: discovering a new kind of battery or a new way of capturing solar energy is not like creating a new app. Fracking—to take one example—was not the brainchild of private-sector research but the fruit of research paid for 20 years ago by the D.O.E. Yet fracking has collapsed the price of oil and gas and led to American energy independence. Solar and wind technologies are another example. The Obama administration set a goal in 2009 of getting the cost of utility-scale solar energy down by 2020 from 27 cents a kilowatt-hour to 6 cents. It's now at seven cents, and competitive with natural gas because of loans made by the D.O.E. "The private sector only steps in once D.O.E. shows it can work," said Franklin Orr, a Stanford professor of engineering who has just finished a two-year leave of absence, while he oversaw the D.O.E.'s science programs.

John MacWilliams had enjoyed success in the free market that the employees of the Heritage Foundation might only fantasize about, but he had a far less Panglossian view of its inner workings. "Government has always played a major role in innovation," he said. "All the way back to the founding of the country. Early-stage innovation in most industries would not have been possible without government support in a variety of ways, and it's especially true in energy. So the notion that we are just going to privatize early-stage innovation is ridiculous. Other countries are outspending us in R&D, and we are going to pay a price."

Politically, the loan program had been nothing but downside. No one had paid any attention to its successes, and its one failure—Solyndra—had allowed the right-wing friends of Big Oil to bang on relentlessly about government waste and fraud and stupidity. A single bad loan had turned a valuable program into a political liability. As he dug into the portfolio MacWilliams feared it might contain other Solyndras. It didn't, but what he did find still disturbed him. The D.O.E. had built a loan portfolio that, as MacWilliams put it, "JPMorgan would have been happy to own." The whole point was to take big risks the market would not take, and they were making money! "We weren't taking nearly enough risk," said MacWilliams. The fear of losses that might in turn be twisted into anti-government propaganda was threatening the mission.

In late June I went for a long drive in hopes of getting a clearer picture of Risks Four and Five, which MacWilliams had gone on to describe for me at greater length—urgent threats to American life that might just then have been keeping the leadership of Trump's D.O.E. awake at night, if there had been any leadership. I started out in Portland, Oregon, heading east, along the Columbia River.

An hour or so into the drive, the forests vanish and are replaced by desolate scrubland. It's a startling sight: a great river flowing through a

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desert. Every so often I pass a dam so massive it's as if full-scale replicas of the Department of Energy's building had been dropped into the river. The Columbia is postcard lovely, but it is also an illustration of MacWilliams's fourth risk. The river and its tributaries generate more than 40 percent of the hydroelectric power for the United States; were the dams to fail, the effects would be catastrophic.

The safety of the electrical grid sat at or near the top of the list of concerns of everyone I spoke with inside the D.O.E. Life in America has become, increasingly, reliant on it. "Food and water has become food and water and electricity," as one D.O.E. career staffer put it. Back in 2013 there had been an incident in California that got everyone's attention. Late one night, just southeast of San Jose, at Pacific Gas and Electric's Metcalf substation, a well-informed sniper, using a .30-caliber rifle, had taken out 17 transformers. Someone had also cut the cables that enabled communication to and from the substation. "They knew exactly what lines to cut," said Tarak Shah, who studied the incident for the D.O.E. "They knew exactly where to shoot. They knew exactly which manhole covers were relevant—where the communication lines were. These were feeder stations to Apple and Google." There had been enough backup power in the area that no one noticed the outage, and the incident came and went quickly from the news. But, Shah said, "for us it was a wake-up call." In 2016 the D.O.E. counted half a million cyber-intrusions into various parts of the U.S. electrical grid. "It's one thing to put your head in the sand for climate change—it's like *mañana*," says Ali Zaidi, who served in the White House as Obama's senior adviser on energy policy. "This is here and now. We actually don't have a transformer reserve. They're like these million-dollar things. Seventeen transformers getting shot up in California is not like, Oh, we'll just fix the problem. Our electric-grid assets are growingly vulnerable."

In his briefings on the electrical grid MacWilliams made a specific point and a more general one. The specific point was that we don't actually have a national grid. Our electricity is supplied by a patchwork of not terribly innovative or imaginatively managed regional utilities. The federal government offers the only hope of a coordinated, intelligent response to threats to the system: there is no private-sector mechanism. To that end the D.O.E. had begun to gather the executives of the utility companies, to educate them about the threats they face. "They all sort of said, 'But is this really real?'" said MacWilliams. "You get them security clearance for a day and tell them about the attacks and all of a sudden you see their eyes go really wide."

His more general point was that managing risks was an act of the imagination. And the

human imagination is a poor tool for judging risk. People are really good at responding to the crisis that just happened, as they naturally imagine that whatever just happened is most likely to happen again. They are less good at imagining a crisis before it happens—and taking action to prevent it. For just this reason the D.O.E. under Secretary Moniz had set out to imagine disasters that had never happened before. One scenario was a massive attack on the grid on the Eastern Seaboard that forced millions of Americans to be relocated to the Midwest. Another was a Category Three hurricane hitting Galveston, Texas; a third was a major earthquake in the Pacific Northwest that, among other things, shut off the power. Yet, even then, the disasters they imagined were the sort of disasters that a Hollywood screenwriter might imagine: vivid, dramatic events. MacWilliams thought that, while such things did happen, they were not the sole or even the usual source of catastrophe. What was most easily imagined was not what was most probable. It wasn't the things you think of when you try to think of bad things happening that got you killed, he said. "It is the less detectable, systemic risks." Another way of putting this is: The risk we should most fear is not the risk we easily imagine. It is the risk that we don't.

Which brings us to the fifth risk.

The Fifth Risk

When you set out to list the major risks inside a place with a mission as nerve-racking as the D.O.E.'s, your mind naturally seeks to order them. One crude way that MacWilliams ordered the 150 or so risks on his final list was to plot them on a simple graph, with two axes. On one axis was "probability of an accident." On the other axis was "consequences of an accident." He placed risks into one of the graph's four quadrants. A nuclear bomb exploding in an assembly plant and blowing up the Texas Panhandle: high consequence, low probability. A person hopping a perimeter security fence at one of the D.O.E. facilities: low consequence, high probability. And so on. Mainly, he wanted to make sure the department was paying sufficient attention to the risks that fell into the graph's most unpleasant quadrant—high probability of an accident/big consequences if it happens. He noticed that many of the risks that fell into this quadrant were giant multi-billion-dollar projects managed by the D.O.E. MacWilliams coined his own acronym: BAFU. Billions and All Fucked Up.

Anyway, when I had asked him for the fifth risk he thought about it and then seemed to relax a bit. I realized later that the fifth risk did not put him at risk of revealing classified information. To begin, he said simply, "Project management."

Four hours out of Portland I arrive at what is maybe the single finest case study of the problem. In December 1938, German scientists discovered uranium fission. Physicist Enrico

Fermi's report on the Germans' work made its way to Albert Einstein, and in 1939 Einstein wrote a letter to Franklin Roosevelt. That letter is the founding document of the Department of Energy. By the early 1940s the United States government understood that for democracy to survive it needed to beat Hitler to the atom bomb, and that the race had two paths—one required enriched uranium, the other plutonium. In early 1943, the United States Army was evicting everyone from an area in Eastern Washington nearly half the size of Rhode Island and setting out to create plutonium in order to build a nuclear bomb. The site of Hanford was chosen for its proximity to the Columbia River, which could supply the cooling water while its dams provided the electricity needed to make plutonium. Hanford was also chosen for its remoteness: the army was worried about both enemy attacks and an accidental nuclear explosion. Hanford was, finally, chosen for its poverty. It was convenient that what would become the world's largest public-works project arose in a place from which people had to be paid so little to leave.

From 1943 until 1987, as the Cold War was ending and Hanford closed its reactors, the place created two-thirds of the plutonium in the United States' arsenal—a total of 70,000 nuclear weapons since 1945. You'd like to think that if anyone had known the environmental consequences of plutonium, or if anyone could have been certain that the uranium bomb would work, they'd never have done here what they did. "Plutonium is hard to produce," said MacWilliams. "And hard to get rid of." By the late 1980s the state of Washington had gained some clarity on just how hard and began to negotiate with the U.S. government. In the ensuing agreement the United States promised to return Hanford to a condition where, as MacWilliams put it, "kids can eat the dirt." When I asked him to guess what it would cost to return Hanford to the standards now legally required, he said, "A century and a hundred billion dollars." And that was a conservative estimate.

More or less overnight Hanford went from the business of making plutonium to the even more lucrative business of cleaning it up. In its last years of production the plutonium plant employed around 9,000 people. It still employs 9,000 people and pays them even more than it used to. "It's a good thing that we live in a country that cares enough to take the time it will take, and spend the money it will spend, to clean up the legacy of the Cold War," said MacWilliams. "In Russia they just drop concrete on the stuff and move on."

The Department of Energy wires 10 percent of its annual budget, or \$3 billion a year, into this tiny place and intends to do so until the radioactive mess is cleaned up. And even though what is now called the Tri-Cities area is well populated and amazingly prosperous—yachts on the river, \$300 bottles of wine in the bistros—the absolute worst thing that

could happen to it is probably not a nuclear accident. The worst thing that could happen is that the federal government loses interest in it and slashes the D.O.E.'s budget—as President Trump has proposed to do. And yet Trump won the county in which Hanford resides by 25 points.

The next morning, with a pair of local guides, I drive into the D.O.E. project most direly in need of management. In my lap is a book of instructions for visitors: “Report any spill or release,” it says, among other things. “Nobody in the world has waste like ours,” says one of my guides as we enter the site. No one has so much strontium 90, for instance, which behaves a lot like calcium and lodges inside the bones of any living creatures it penetrates, basically forever. Along with chromium and tritium and carbon tetrachloride and iodine 129 and the other waste products of a plutonium factory it is already present in Hanford’s groundwater. There are other nuclear-waste sites in the United States, but two-thirds of all the waste is here. Beneath Hanford a massive underground glacier of radioactive sludge is moving slowly, but relentlessly, toward the Columbia River.

The place is now an eerie deconstruction site, with ghost towns on top of ghost towns. Much of the old plutonium plant still stands: the husks of the original nine reactors, built in the 1940s, still line the Columbia River, like grain elevators. Their doors have been welded shut, and they have been left to decay—for another century. “Cold and dark is a term we like to use,” says one of my guides, though he adds that rattlesnakes and other living creatures often find their way into the reactors. Of the settlement that existed before the government seized the land, there remain the stumps of trees from what were once orchards and the small stone shell of the town bank. There are older ghosts here, too. What looks like arid scrubland contains countless Indian burial grounds and other sites sacred to the tribes who lived here: the Nez Perce, the Umatilla, and the Yakama. For the 13,000 years or so prior to the white man’s arrival the place had been theirs. To them the American experiment is no more than the blink of an eye. “You have only been here 200 years, so you can only imagine 200 years into the future,” as a Nez Perce spokesman put it to me. “We have been here tens of thousands of

years, and we will be here forever. One day we will again eat the roots.”

Three years ago the D.O.E. sent the local tribes a letter to say they shouldn’t eat the fish they caught in the river more than once a week. But for the longest time, the effects of radiation on the human body were either ignored or insincerely explored: no one associated with the business of creating it wanted the knowledge that might disrupt it. Downwind of Hanford, people experienced unusually high rates of certain kinds of cancer, miscarriages, and genetic disorders that went largely ignored. “It’s easy to have no observable health effects when you never look,” the medical director of the Lawrence Livermore lab said, back in the 1980s, after seeing how the private contractors who ran Hanford studied the matter. In her jaw-dropping 2015 book, *Plutopia*, University of Maryland historian Kate Brown compares and contrasts American plutonium production at Hanford and its Soviet twin, Ozersk. The American understanding of the risks people ran when they came into contact with radiation may have been weaker than the Soviets’. The Soviet government was at least secure in the knowledge that it could keep any unpleasant information to itself. Americans weren’t and so avoided the information—or worse. In 1962 a Hanford worker named Harold Aardal, exposed to a blast of neutron radiation, was whisked to a hospital, where he was told he was perfectly O.K. except that he was now sterile—and back then it didn’t even make the news. Instead, Hanford researchers in the late 1960s went to a local prison and paid the inmates to allow the irradiation of their testicles, to see just how much radiation a man can receive before the tails fall from his sperm.

A young elk gallops across the road in front of our car. He owes his existence, perhaps, to the atom bomb: hunting hasn’t been allowed on the 586-square-mile tract since 1943, and so there’s game everywhere—geese, ducks, cougars, rabbits, elk, and deer. We drive past T plant, the long gray concrete building where they brought the irradiated material from the reactors, to cull the plutonium that went into the bomb that destroyed Nagasaki. Because it, too, is cold and dark, it is of less concern than the land surrounding it, for that is where the waste from the plant got dumped. The Nagasaki bomb con-

tained about 14 pounds of plutonium, but the waste generated fills acres of manicured dirt, the texture of a baseball infield, just downhill from the plant. “The tank farm,” they call it.

On these farms lay buried 177 tanks, each roughly the size of a four-story apartment building and capable of holding a million gallons of “high-level waste.” Fifty-six million gallons now in the tanks are classified as “high-level waste.” What, you might ask, is high-level waste? “Incredibly dangerous stuff,” says Tom Carpenter, executive director of the Hanford Challenge, the organization which has monitored the site since the late 1980s. “If you’re exposed to it for even a few seconds you probably got a fatal dose.” And yet as you drive by, you would never know anything unusual was happening on the infield were it not for the men crawling over it, with scuba tanks on their backs and oxygen masks on their faces.

Hanford turns out to be a good example of an American impulse: to avoid knowledge that conflicts with whatever your narrow, short-term interests might be. What we know about Hanford we know mainly from whistle-blowers who worked inside the nuclear facility—and who have been ostracized by their community for threatening the industry in a one-industry town. (“Resistance to understanding a threat grows with proximity,” writes Brown.) One hundred and forty-nine of the tanks in the Hanford farms are made of a single shell of a steel ill-designed to contain highly acidic nuclear waste. Sixty-seven of them have failed in some way and allowed waste or vapors to seep out. Each tank contains its own particular stew of chemicals, so no two tanks can be managed in the same way. At the top of many tanks accumulates a hydrogen gas, which, if not vented, might cause the tank to explode. “There are Fukushima-level events that could happen at any moment,” says Carpenter. “You’d be releasing millions of curies of strontium 90 and cesium. And once it’s out there it doesn’t go away—not for hundreds and hundreds of years.”

The people who created the plutonium for the first bombs, in the 1940s and early 1950s, were understandably in too much of a rush to worry about what might happen afterward. They simply dumped 120 million gallons of high-level waste, and another 444 billion gallons

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Department of Energy

of contaminated liquid, into the ground. They piled uranium (half-life: 4.5 billion years) into unlined pits near the Columbia River. They dug 42 miles of trenches to dispose of solid radioactive waste—and left no good records of what's in the trenches. In early May of this year a tunnel at Hanford, built in the 1950s to bury low-level waste, collapsed. In response, the workers dumped truckloads of dirt into the hole. That dirt is now classified as low-level radioactive waste and needs to be disposed of. "The reason the Hanford cleanup sucks—in a word—is shortcuts," said Carpenter. "Too many god-damn shortcuts."

There is another way to think of John MacWilliams's fifth risk: the risk a society runs when it falls into the habit of responding to long-term risks with short-term solutions. Program management is not just program management. Program management is all the "less detectable, systemic risks." Some of the things any incoming president should worry about are fast-moving: natural disasters, terrorist attacks. But most are not. Most are like bombs with very long fuses that, in the distant future, when the fuse reaches the bomb, might or might not explode. It is delaying repairs to a tunnel filled with lethal waste until, one day, it collapses. It is the aging workforce of the D.O.E.—which is no longer attracting young people as it once did—that one day loses track of a nuclear bomb. It is the ceding of technical and scientific leadership to China. It is the innovation that never occurs, and the knowledge that is never created, because you have ceased to lay the groundwork for it. It is what you never learned that might have saved you.

Toward the end of his time as secretary of energy, Ernie Moniz suggested that the department, for the first time ever, conduct a serious study of the risks at Hanford. Once the risks were spelled out, perhaps everyone would agree that it was folly to try to turn it into, say, a playground. Maybe the U.S. government should just keep a giant fence around the place and call it a monument to mismanagement. Maybe the people at the labs could figure out how to keep the radioactivity from seeping into the Columbia River and leave it at that. Maybe it shouldn't be the D.O.E.'s job to deal with the problem, as the problem had no good solution and the political costs of constant failure interfered with the D.O.E.'s ability to address problems it might actually solve.

It turned out no one wanted to make a serious study of the risks at Hanford. Not the contractors who stood to make lots of money from things chugging along as they have. Not the career people inside the D.O.E. who oversaw the project and who feared that an open acknowledgment of all the risks was an invitation to even more lawsuits. Not the citizens of Eastern

Washington, who count on the \$3 billion a year flowing into their region from the federal government. Only one stakeholder in the place wanted to know what was going on beneath its soil: the tribes. A radioactive ruin does not crumble without consequences, and yet, even now, no one can say what these are.

Here is where the Trump administration's willful ignorance plays a role. If your ambition is to maximize short-term gains without regard to the long-term cost, you are better off not knowing those costs. If you want to preserve your personal immunity to the hard problems, it's better never to really understand those problems. There is a downside to knowledge. It makes life messier. It makes it a bit more difficult for a person who wishes to shrink the world to a worldview.

There is a telling example of this Trumpian impulse—the desire not to know—in a small D.O.E. program that goes by its acronym, ARPA-E. ARPA-E was conceived during the George W. Bush administration as an energy equivalent of DARPA—the Defense Department's research-grant program that had funded the creation of G.P.S. and the Internet, among other things. Even in the D.O.E. budget the program was trivial—\$300 million a year. It made small grants to researchers who had scientifically plausible, wildly creative ideas that might change the world. If you thought you could make water from sunlight, or genetically engineer some bug so that it eats electrons and craps oil, or create a building material that becomes cooler on the inside as it grows hotter on the outside, ARPA-E was your place. More to the point: your only place. At any given time in America there are lots of seriously smart people with bold ideas that might change life as we know it—it may be the most delightful distinguishing feature of our society. The idea behind ARPA-E was to find the best of these ideas that the free market had declined to finance and make sure they were given a chance. Competition for the grants has been fierce: only two out of every hundred are approved. The people who do the approving come from the energy industry and academia. They do brief tours of duty in government, then return to Intel and Harvard.

The man who ran the place when it opened was Arun Majumdar. He grew up in India, finished at the top of his engineering class, moved to the United States, and became a world-class materials scientist. He now teaches at Stanford University but could walk into any university in America and get a job. Invited to run ARPA-E, he took a leave from teaching, moved to Washington, D.C., and went to work for the D.O.E. "This country embraced me as one of her sons," he said. "So when someone is calling me to serve, it is hard to say no." His only demand was that he be allowed to set up the program in a small office down the street from the Department of Energy building. "The feng shui of D.O.E. is really bad," he explained.

Right away he faced the hostility of right-wing think tanks. The Heritage Foundation even created its own budget plan back in 2011 that eliminated ARPA-E. American politics was alien to the Indian immigrant; he couldn't fathom the tribal warfare. "Democrat, Republican—what is this?," as he put it. "Also, why don't people vote? In India people stand in line in 40 degrees Celsius to vote." He phoned up the guys who had written the Heritage budget and invited them over to see what they'd be destroying. They invited him to lunch. "They were very gracious," said Majumdar, "but they didn't know anything. They were not scientists in any sense. They were ideologues. Their point was: the market should take care of everything. I said, 'I can tell you that the market does not go into the lab and work on something that might or might not work.'"

Present at lunch was a woman who, Majumdar learned, helped to pay the bills at the Heritage Foundation. After he'd explained ARPA-E—and some of the life-changing ideas that the free market had failed to fund in their infancy—she perked up and said, "Are you guys like DARPA?" Yes, he said. "Well, I'm a big fan of DARPA," she said. It turned out her son had fought in Iraq. His life was saved by a Kevlar vest. The early research to create the Kevlar vest was done by DARPA.

The guys at Heritage declined the invitation to actually visit the D.O.E. and see what ARPA-E was up to. But in their next faux budget they restored the funding for ARPA-E. (The Heritage Foundation did not respond to questions about its relationship with the D.O.E.)

As I drove out of Hanford the Trump administration unveiled its budget for the Department of Energy. ARPA-E had since won the praise of business leaders from Bill Gates to Lee Scott, the former C.E.O. of Walmart, to Fred Smith, the Republican founder of FedEx, who has said that "pound for pound, dollar for dollar, activity for activity, it's hard to find a more effective thing government has done than ARPA-E." Trump's budget eliminates ARPA-E altogether. It also eliminates the spectacularly successful \$70 billion loan program. It cuts funding to the national labs in a way that implies the laying off of 6,000 of their people. It eliminates all research on climate change. It halves the funding for work to secure the electrical grid from attack or natural disaster. "All the risks are science-based," said John MacWilliams when he saw the budget. "You can't gut the science. If you do, you are hurting the country. If you gut the core competency of the D.O.E., you gut the country."

But you can. Indeed, if you are seeking to preserve a certain worldview, it actually helps to gut science. Trump's budget, like the social forces behind it, is powered by a perverse desire—to remain ignorant. Trump didn't invent this desire. He is just its ultimate expression. □