David Goldman, accident investigator and expert witness, raised his hand and pointed out to his driver the approaching fence on the left. The car slowed and turned off the highway, passing gingerly through the open gate and on to the dusty and bumpy farm road. Rich Higgens, the young attorney working on the case, was visibly perturbed about driving his new BMW over the unpaved road. It was the kind of thing you needed to think about before going on a site visit like this, perhaps the kind of thing Rich would eventually learn, thought David.

The dirt billowed around the tires and settled to the glossy black exterior of the car. Rich leaned forward to look out the windshield and the dust on the hood.

"So much for the wash and wax."
The road ran straight back for a quarter of a mile and then cut squarely to the right, running parallel to another pole and wire fence. David checked his scribbled directions one last time. They were looking for the gate at the end. There, directly ahead, were the big overhead power lines, the location of the accident. Rich slowed the car and angled left through the opening, then stopped just inside the gate and turned off the ignition.

It was quiet outside, strangely quiet. Up above were the half-dozen live electric transmission wires that ran between the poles. They looked innocent enough way up there, but the lines were one of the main reasons for their trip out to the farm that day.

David enjoyed getting away from the office, especially when he could do a little work out in the open country. He knew that, on this particular job, the answers to his questions would most likely be found at the site of the accident; and he was much like a detective who speeds to the scene of a crime to find his clues. One of his biggest problems had been convincing the client of the need to spend time studying the site and interviewing the people involved. As on so many cases, the attorneys said that they would take care of collecting the facts; David’s job was to analyze. They seldom understood the types of things for which he was looking or the bias in their own views. You had to put yourself in the victim’s shoes, understand what it was that they were doing, see what they had seen. This was something that could not be done by listening to second- and third-hand accounts from people who had a financial interest in the outcome.

The attorneys had racked-up hundreds of hours concocting reasons “why” and “how” the accident had occurred. Yet none of them, amazingly enough, had taken the time to come out here
Chutes and Ladders

and spend the day examining the setting and talking with the people who actually did the work. A man had died in this accident, and it was especially important that David understand exactly what had happened and why.

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Rich walked around from the driver's side. His black-tasseled penny loafers and the cuffs of his suit pants were already sprinkled with dust.

"Well, I think this is the place," announced Rich. "John said he would watch for us and come over when we pulled up." John Weiss was the foreman on this section of the property. He was probably out in one of the nearby fields and would see them as they drove across the dirt road.

Sure enough, a white, late-model pickup was casually making its way toward them from a distant field to the west. David leaned back against the side of Rich's car and looked around the field. The soil and vegetation showed the tell-tale signs of recent activity - vehicles and harvesting equipment had been through. The sky was gray and overcast, but it had not rained for much of the summer and the ground was dry. The hops growing in the field had probably been harvested within the last week.

Off in an adjacent field, on the other side of a long and narrow line of trees, he could see a group of men working. Like most of the farmworkers in this part of the state, these were probably Hispanic men. They appeared to be packing up long aluminum irrigation pipes lying in the field, but it was a little difficult to tell from this distance.

The local dry spell of the past two growing seasons had compelled farmers to undertake regular irrigation of their hops, and the only way to effectively water under such conditions,
David knew, was with sprinklers. Accordingly, the long, 38 ft. aluminum pipes had to be laid out, the field watered, and the lines disconnected and stacked on the long, lanky trailers. The cost of moving the sprinklers from field to field was less than purchasing multiple systems, so crews of men were kept busy disassembling, moving, and reassembling the pipes.

And that, of course, was the second reason why he and Rich were there. As had happened a number of times in this part of the state this summer, a farmworker, Arturo Salvador, had been electrocuted on this very spot a few months back. The source of power, as in all of the other electrocutions, had obviously been the power lines above. And there was no mystery about how the current had traveled from the power lines to Arturo Salvador: through one of the 38-foot aluminum irrigation pipes. The important questions in David’s mind were the “how” and “why” of the tragedy. First, how did the pipe that Arturo Salvador held come in contact with the power line? And second, why did he lift the pipe so high in the air near the power line in the first place? It would be for the attorneys, a judge, and a jury to decide who was ultimately responsible for the accident, but it was his job to explain how and why it had happened. This was the only way to begin the process of addressing the problem and reducing the chances of future accidents.

The attorneys for the plaintiffs and the attorneys for the defense were locked in endless and often pointless battles over who was responsible for the accidents and who, if anyone, should bear the financial consequences. Some said it was due to careless farmworkers; some claimed that it was the power company’s fault for putting the lines there in the first place. Some even maintained that the pipe manufacturer was responsible. And of course there were those who blamed the farmers. David’s concern, however, was not blame or reparation. His interest was with Arturo Salvador’s job and
tasks on that fateful day and the circumstances that led to the accident. This was not an act of suicide, and there had to be a unique set of circumstances leading up to his death. All of the other arguments and discussions were of little concern to him, and he felt that most of the work to date had been pointless. The only important thing to him was determining why and how this accident and the others like it had occurred and what could be done to stop it from happening again. David believed strongly that there were simple answers to his questions as well as simple solutions to the problem.

There were so many questions that had not been answered -- or even asked -- during the "investigations" into these mishaps. Perhaps it had been the preoccupation with the monetary settlements or maybe the remoteness of the location. It was also possible, as some alleged, that the accidents had not been thoroughly investigated because they all involved migrant laborers. Whatever the case, he was determined to understand why these mishaps had occurred. It did not matter if he was working for the families of the victims, the power company, the farm owners, or even the manufacturer of the pipes. His job was to determine the circumstances and human actions that were leading to these electrocutions -- and, specifically, the electrocution of Arturo Salvador.

One thing David knew for certain was that the combination of the low power lines above the farm land and the long conductive irrigation pipes was disastrous. Like oil and water, some things were simply not meant to go together. As long as the power lines transversed the farms and as long as the pipes were long and conductive, there was the potential for fatal accidents. This case was not at all unlike others on which he had worked involving aluminum masts on small pleasure boats. With frightening regularity, unsuspecting sailors were being
electrocuted in and around waterways when their tall, conductive masts contacted live overhead lines. The accidents provided lots of work for the attorneys and investigators, and the resulting education efforts with sailors apparently had some positive effects. But the real issue, David knew, was that these two conditions should simply not coexist, and, as long as they did, no warning sign, label, or so-called education program was going to eliminate these accidents. He suspected that the same was true of the electrocutions on the farms in this part of the state.

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John Weiss, the foreman, drove his pickup through the gate and stopped next to their car. Rich and David walked over to meet him. John was courteous, but he obviously had other things on his mind and was visibly unenthusiastic about meeting them out here in the field. He wasted no time making his opinion clear -- the accident was due only to Arturo Salvador’s own stupidity. There was not, in his opinion, much of anything for the attorney and the so-called accident expert to see out in the field, and certainly nothing to learn by driving out here. Arturo Salvador had lifted the pipe and touched the power line. It was as simple as that. He would show them around and answer any questions that they might have, but they were wasting their time.

There was little doubt in David’s mind that the foreman was really there to see that he and Rich stayed out of trouble. John Weiss wasn’t going to be of any help, but they had to get started somehow. Perhaps if he asked the foreman for his opinion he would leave him alone long enough for him to get some real work done. There were times when it paid to flaunt your ignorance.

“Well, can we at least hear what you know about the
accident? This is the first time Rich and I have been out here, and we would like to get a feeling for what happened,” said David.

“Whatever suits you.”

David walked over to the long irrigation pipe lying on the ground near the truck. It was the very pipe that Arturo Salvador was holding when he was electrocuted. His first question was the most obvious one. “Do you know why he had the pipe up in the air?”

“Well, my guess is that he was moving it away from the gate so he could drive his truck through.”

David had heard this theory before from one of the attorneys. True, this might have been a reason for moving the pipe, but it had little, if anything, to do with why he might have had the pipe up in the air.

David couldn’t let this one go. “Uh huh. But, why would the pipe be up so high in the air if all he was doing was moving it. Can’t you just pick up one end of this and pivot it around?”

“Well, hell, I don’t know,” snapped the foreman. “Who knows why he did it.”

David continued. “Did he have any equipment out here? A lift or a crane or something? How could he have raised it that high into the air?”

“Well, your guess is as good as mine. I don’t have all of the answers,” said the foremen.

This guy didn’t have any answers. And Rich didn’t want to get his clothes dirty. David Goldman realized that he was going to have to figure things out by himself.

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Rich and the foreman began their own conversation, so David walked along the length of the five-inch diameter pipe
thinking about the accident and how Arturo Salvador might have lifted it up into the air. The foreman’s argument that Arturo Salvador moved the pipe to drive out the gate was plausible, but it didn’t make sense in view of the other evidence. There had been a number of these electrocutions that summer, and they all were certainly not caused by pipes blocking fences and roads. Plus, there would have been no reason to stand the pipe up into the air. There had to be another explanation, but he could not think of one. He would set that question aside for the time being and address the question of “how.” More specifically, how did he get it into the air?

David reached the end of the pipe, slid the note pad into the back pocket of his jeans, stooped down, and lifted the pipe up to waist level. It was astoundingly light, much lighter than those aluminum masts he had tried raising while working on the boating electrocution case. Why not give it a try? He lifted the end up over his head and simultaneously stepped underneath it, arms straight up and elbows locked, the weight of the pipe resting on his palms. The other end was parked solidly down in the soft dirt 38 feet away. The pipe had quite a bit of flex. David then walked forward with the end of the pipe held over his head. With each step he moved his hands forward down the pipe. It got heavier as he continued, especially once he reached the halfway point, but in no time at all the back end of the long aluminum irrigation pipe was towering high into the air.

It was as sudden and as unexpected as it could have been. “Stop!” It was Rich, screaming at the top of his lungs. “Stop! Don’t move!”

He looked up toward the sky, his shoulders and arms frozen in place over his head. Sure enough, the end of the irrigation pipe was about a yard away from one of the power lines overhead. He had forgotten completely about it, just as Arturo Salvador had forgotten about it the month before. The lines
were well above and out of his normal line of sight, and he would not have thought of looking up, especially out here in a big open field. And this was perhaps the only field on the entire farm with a power line - yet another reason to conclude that Arturo was not thinking about the danger overhead. David backed up a few feet away from the wire and let the pipe fall back down beside him. It reverberated loudly as it smacked and bounced up off the ground.

David walked back over to his two spectators. The foreman said nothing, but Rich could not resist the temptation.

"That would have been great, Dave. I can just imagine the headline: 'Safety expert electrocuted while reenacting accident'!"

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It had been a close call, but David Goldman had now answered two of his questions. First, Arturo probably “stepped” the pipe up to a vertical position, just as he had done moments before. The pipe was not especially heavy, and raising it was something most any adult could do. He also understood how he might have done this without considering or seeing the overhead wires. Plus, Arturo was probably looking down at the end of the pipe resting on the ground, making sure that it was not going to pop up in front of him after passing the halfway point while he “stepped” the pole.

But the most puzzling question of all still remained unanswered. Why did Arturo have the pipe pointed up into the air in the first place? You could move one of these by lifting it up right in the middle. You could probably even balance and carry it on your shoulder by yourself. And there was no question that a person could move it a few feet quite easily by lifting only one end and pivoting it on the other. So why would
he have wanted to stand it up in the air as David had just done? It didn’t make sense.

David turned to the foreman. “Do you mind if I walk over there and talk to some of those guys?” referring to the crew in the adjacent field. They were disassembling the irrigation pipes and loading them on the trailers. David had always believed that the best answers were found at the source.

“By all means, help yourself,” responded the foreman.

“OK. Then, I’ll be back in a few minutes.” He walked away and left Rich and the foreman standing next to the truck.

He was about 30 feet away when the foreman shouted out, “Hope you speak Spanish!”

David walked along the headland, next to the fence, until he reached the corner of the large adjacent field where there were about a dozen men working. They were disconnecting the long irrigation pipes and carrying them over to the trailers where they were stacked. He approached one of the long trailers where two men adjusted the pipes on top. It was all a little awkward. These men were, no doubt, friends with Arturo, and they might be suspicious and defensive. Should he try to introduce himself in his mumbling Spanish, or speak English? He just didn’t want to be rude. His concern, as it turned out, was unjustified.

One of the two men near the trailer wiped the dirt off his right hand on his pant leg and extended it to David as he approached.

“Hi. How do you do?” said the farmworker in flawless English as they shook hands. “I assume you are here to investigate Art’s accident?”

“Yes I am. May I ask you a few questions?”

“Sure. Whatever we can do to help. But you know that no
one else was around when it happened.”

“Yes, that's what I've heard.” He paused for a moment and then continued. “There is really only one question that I have. No one seems to know why he was holding the pipe up in the air like that. Do you have any ideas?”

The farmworker smiled modestly, then raised his hand to eye level and wiggled his pointer finger to say “follow me.” He turned and walked over to the end of one of the pipes lying on the ground about 50 feet away. He hesitated and turned to look back and then around to a few of his coworkers who had stopped what they were doing to watch the show. David thought he saw him wink, but he wasn’t sure. Then he stooped down and grabbed the end of the pipe with both of his hands.

This was all very odd. These men were grinning. They obviously knew something he did not.

The farmworker lifted the end of the pipe to the level of his waist and on up over his head. Then, just as David had done minutes before in the adjacent field, he “stepped” the end of the pipe up into the air. Seconds later it was vertical, with the bottom end resting firmly on the ground. He looked around to the other men, then bent his knees and hugged the pipe firmly between his arms and chest. His knees straightened up and the bottom of the pipe raised about a foot off the ground, the 38 feet of aluminum pointed straight up into the sky. He twisted his torso and shoulders quickly left and right a few times, and the pipe began to wobble and wiggle.

Jostled loose from its comfortable haven deep inside, a plump beige and white rabbit plopped down out the bottom of the pipe, rear-end first, its hind legs wedged up under its chest. It landed on the dusty ground and twisted, trying to get its legs up underneath, but not before the other large ball of fur dropped down onto its head. The two rabbits rolled to their feet, hesitated for a split second, and scampered across the field in
terror.

“Great entertainment!” said the field hand, as his friends laughed and turned back to their work.

REFERENCES AND NOTES

The names of the characters in this story are fictitious. Any similarity to their actual names is purely coincidental.
SET PHASERS ON STUN

And Other True Tales of Design, Technology, and Human Error

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