

Rushing oil through pipes: The risks, consequences and role of human error in spills

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The big picture:

- Pipelines are the most reliable way to transport oil, but too often they're built in environmentally, culturally or economically sensitive areas, with little regard to the consequences of a spill.
- Every spill is ultimately the result of human error, sometimes associated with complacency. Though we don't seem to be getting better at preventing them, we have gotten better at remediating them.
- Decreasing demand for oil is the only way to eliminate the risk of future [oil spills](#). Fortunately, the end of oil as a major fuel source for the transportation sector is in sight.

Eight years ago, while Canadians were debating a proposal for a 731-mile oil [pipeline](#), USC Wrigley Institute for Environmental Studies Director Joe Árvai (then a faculty member at the University of Calgary) wrote an op-ed for Canada's The Hill Times, arguing that the inevitability of human error leads to another inevitability: As long as we have oil pipelines, we will have oil spills.

Now the Dana and David Dornsife Chair in Psychology at the USC Dornsife College of Letters, Arts and Sciences, Árvai studies how humans assess risk and make decisions. In the wake of the recent Orange County oil spill, he answers questions about the risks and future of oil transportation by pipeline.

The investigation of the Orange County oil spill is ongoing and so are studies of the impact, but what are your thoughts about the severity of the spill and lasting consequences to the environment?

There are more qualified experts than me, but based on my early training in oceanography, the short answer is: it depends. Oil spills in the open ocean tend to be lower-impact because oil floats, and few species spend

all their time at the surface. Oil also eventually dissipates, sinks and evaporates. This all helps mitigate—but doesn't eliminate—the negative consequences of an open-ocean spill. The damage is much worse when a spill reaches the coast.

The [1989] Exxon Valdez and [2010] Deepwater Horizon spills are the most recent poster children for this kind of disaster. The Exxon Valdez spill devastated the intertidal ecosystem of Prince William Sound [Alaska] for decades. We're seeing the same slow timeline play itself out in the marshes and estuaries of the Gulf Coast after Deepwater Horizon.

Oil spills also cause devastating social and economic consequences. They drive away tourists, the fishing industry and recreation. Making matters even worse, they often affect places of great cultural importance to First Nations people, such as the Tongva-Gabrielino here in Southern California.

At the very least, human error seems to have worsened the Orange County leak. Why do such errors happen so often, particularly in a highly-regulated industry?

Because pipelines are built and maintained by people, every single oil spill from them comes back to human error. We're probably going to have to wait a while to see what really took place in Orange County, but usually these spills occur because monitoring and retrofitting don't happen as often and as carefully as they should, or because a boat or other machinery comes too close and damages the pipeline. Then add to this what happens when there are failures in the human systems that are supposed to respond to these kinds of accidents.

The 2010 rupture of the Enbridge Pipeline near Marshall, Michigan,

spilled 843,000 gallons of oil into the ecologically sensitive Kalamazoo River. After the initial alarm, it took people in the control room nearly 18 hours to shut off the flow of oil. Why? Because they thought they were receiving faulty data from sensors in the pipeline. A post-mortem of the spill showed that false alarms were not uncommon, which led to control room operators habitually ignoring alarms. Regulation is no match for human complacency.

Is it currently possible, or will it ever be possible, to have environmentally safe transfer of oil via pipeline?

Here's the big conundrum: Pipelines are, hands-down, the most reliable way to transport oil. Where safety is judged by how much oil gets spilled per unit transported, pipelines are safer than moving oil by rail or by truck. The problem is that we have not paid close enough attention to where we are putting these pipelines in the first place. All too often, we build them in environmentally, culturally or economically sensitive areas, without much regard for the potential consequences if and when a spill should happen.

A case in point is the defunct—for now, anyway—Keystone XL pipeline. Native American tribes in Montana and South Dakota sounded the alarm early and often that both construction and a potential spill could devastate the land and water that they relied on for their survival. They were right, but the federal government had to be convinced to revoke a pipeline license that had already been issued.

Then there's the matter of how many of these pipelines we need in the first place. The oil industry, at least as we currently know it, is entering its final act, as segments of our economy that once relied on oil are now receiving their energy from renewable sources. So, I think we have to ask ourselves: Is the potential social and environmental price tag of

another big accident worth the short-term economic or political benefit of oil exploration and pipeline construction in new areas? In my opinion, the answer is "no."

Since your 2013 op-ed, have we gotten any better at preventing pipeline spills—or cleaning them up?

When it comes to cleaning them up, the short answer is "yes," but for unfortunate reasons. The technology to contain and clean up oil spills has improved thanks to the experience we've gained from all the messes we've made. However, it's very far from perfect. The only reliable way to prevent the damage from an oil spill is to prevent the spill in the first place.

Have we gotten better at preventing them? I think it's pretty clear that history holds the answer: From Exxon Valdez to Deepwater Horizon, and from the [2013] rail disaster in Lac-Mégantic, Quebec, Canada, to the [spill](#) that prompted this conversation, the answer certainly appears to be "no."

So, what—if anything—can be done to mitigate the risk of future spills?

It would be incorrect to suggest that any of the companies involved in disastrous oil spills wanted them to happen. But the simple fact remains that every step of oil production, from recovery to refinement to usage, requires human input and oversight. In that light, mistakes are inevitable.

That being said, I think it's a relatively short matter of time before we see the end of oil as a major fuel source for the transportation sector. For example, electric vehicles are starting to see serious market penetration, which will significantly curtail demand for oil. That alone

will go a long way toward mitigating the risk of future spills. But until then, the next disaster is just around the corner. It's only a matter of where it will happen, and how big and devastating it will be.

Provided by University of Southern California

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