

An accident waiting to happen

The release of radioactive material at a US nuclear-waste repository reveals an all-too-common picture of complacency over safety and a gradual downgrading of regulations.

Source : <http://www.nature.com>, 15 mai 2014

Éditorial du numéro 7.500

On St Valentine's Day, the United States' flagship geological repository for nuclear waste dodged a bullet. Deep below the New Mexico desert, something went wrong. One or more drums of nuclear waste ruptured, probably because of a chemical reaction or explosion. Thousands of drums are held in the 655-metre deep underground repository, designed to safely contain for thousands of years the low- and medium-level radioactive remnants of US military programmes. Just 15 years after it opened, the Waste Isolation Pilot Plant (WIPP) near Carlsbad has been hurriedly closed down while officials seek answers.

Parts of the repository were contaminated with long-lived transuranic radioactive elements, including americium and plutonium. The extent of the contamination is still being established, but the amounts released were not small, and last week officials announced that the repository will remain closed for at least 18 months and possibly much longer. A small amount of radioactivity was also vented to the surface, and 21 workers were exposed to what seem to have been low levels.

It is clear that both the accident and its consequences could have been much worse. Maintenance resulting from a separate and unrelated accident on 5 February — a vehicle fire underground — meant that from 6 to 10 February the ventilation was unfiltered, and real-time continuous radiation monitors were switched off. Had the accident happened then, rather than on 14 February, the release would only have been detected during manual radiation readings that are taken each morning, meaning that workers would unknowingly have been exposed, and higher levels of radioactivity would have reached the environment.

On the evening of the accident, a continuous radiation monitor underground, which sounded the alert to high radiation levels in a waste-storage area at 11.14 p.m., was the only one in service, as all the others were out of order. This resulted in automatic switching of the ventilation to pass by high-efficiency particulate air (HEPA) filtration to catch radioactive particles. Shortly after the alert, a vigilant shift manager opened large fans to vent the repository contamination through the HEPA filters to the environment; this should have happened automatically with no need for manual intervention — but it had been switched to manual some years ago. The ventilation system also fell short of nuclear-safety norms, as it had gaps that allowed some radiation to reach the environment. Workers plugged these gaps with high-density foam on 6 March.

The mantra for WIPP was to “start clean and stay clean”. Accidents, the government said, would never happen. But as a News article on [page 267](#) details, a Department of Energy (DOE) report on the incident outlines how fanciful that promise was. The report describes an atmosphere of complacency. It lists a litany of failings, from an insidious continual deregulation of safety standards and cutting of corners, to dilapidated safety equipment, and a lax security culture. WIPP's response to the accident itself was “delayed and ineffective” adds the report.

The consequences of a release of radioactivity at WIPP, a

repository for low- and medium-level waste deep underground in a remote region, are much less serious than those at a nuclear power plant. But as with the Fukushima nuclear power plant in Japan, the same characteristic errors were in play: hubris, overconfidence in safety assumptions, dilution or non-respect of safety standards, a weak security culture and, crucially, lack of tough, independent scientific and technical oversight.

And, as at Fukushima, it took an accident to uncover glaring safety weaknesses and the lack of a strong safety culture — an essential element in safe nuclear operation. The DOE, which operates WIPP, and the WIPP regulators — including the Environmental Protection Agency — seem to have been asleep at the wheel. The uncovering of these safety deficiencies is all the more disconcerting given that the authorities have been proposing to expand WIPP from a site for low- and medium-level waste to one that would also hold both high-level surplus weapons-grade plutonium and much hotter spent nuclear fuel.

In the past, WIPP was a model of how to integrate science into the planning and design of a nuclear-waste repository, and how to gain public confidence in that science. Its recent shortcomings are a further blow to the pressing need to find ways to deal safely with the vast quantities of accumulated defence and civilian wastes. WIPP and planned repositories elsewhere would do well to heed the lessons of WIPP's troubles, and strive to ensure that transparent independent scientific oversight of projects is made a top priority and maintained.

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