

July 19, 2011

**RE: Complaint Filed 11-10-21 against ChemRisk**

Roman Garcia and Joe Barela  
Investigation and Compliance Division  
New Mexico Board of Licensure for Professional Engineers and Surveyors  
Toney Anaya Building, 2550 Cerrillos Rd., 2nd Floor  
Santa Fe, NM 87507

Dear Mr. Garcia and Mr. Barela:

This letter is to support my Complaint, Number 11-10-21, filed against ChemRisk through its spokesman, Matthew Le, regarding the study and report they did on the Buckman Direct Diversion in Santa Fe.

One of the questions that the Board must consider is whether the study and report by ChemRisk constitute engineering. This letter clarifies why their actions do indeed fall under New Mexico's definition of engineering, and therefore licensure was required. It furthermore explains my contention that ChemRisk's conclusion of "no health risk" is a result of substandard engineering practices, and that the public may be unknowingly at risk as a result.

ChemRisk neither designed nor built the Buckman Direct Diversion – they were merely hired to determine the risk to users of the system. In particular, it is widely known that a variety of highly toxic contaminants from LANL are present from time to time at the location where the diversion pumps take water from the Rio Grande. ChemRisk's charge was to calculate the health risk these contaminants pose to users of the water system.

To be clear, I understand that much of what ChemRisk did could be considered science rather than engineering. Their analyses of the concentration levels for toxins flowing past the intake pumps, the rate toxins are absorbed by drinkers of polluted water, and the frequency with which this will result in illnesses might be considered science rather than engineering.

But what *is* engineering is what ChemRisk did with the science – especially the conclusion they drew. They used their scientific data to produce and sell a report claiming, without qualification, that the Buckman Direct Diversion poses no health risk to the public. This application, or more correctly, *misapplication* of science to produce a creative work proclaiming that an engineered system presents no hazard to the public is an engineering practice under the definition shown in the *Engineering and Surveying Practice Act*, NMSA (1978) 61-23-3, Paragraph E.

That ChemRisk sold engineering without a license is a concern, but it was not the primary reason for my complaint. My foremost concern is that what they produced and sold was *substandard* engineering.

A proper risk analysis, as every engineer knows, involves determination of the probability that a chain of events will result in an unfortunate event, and an assessment of the severity of that event's consequences. Such analyses are core to engineering curricula precisely because of their importance in protecting the public against risks posed by engineered systems.

Instead of performing a rigorous analysis of a chain of events, ChemRisk evaluated risk for events at the head end (that contaminants are present at the pump inlet) and at the back end (that contaminants are absorbed, leading to illness). They then trivialized all of the risks in between by assuming that the engineered safety systems will always remove 95-percent of the four most dangerous contaminants coming from LANL.

**Concluding that there is no health risk once contaminants are removed is a trivial result, made possible by incorrectly assuming that the probability of failure for Buckman's electro-mechanical safety systems is zero and that system operators will never make a mistake.**

Even stating the 95-percent removal assumption in their report, which they did, fails to elevate ChemRisk's work to an acceptable engineering standard. A risk analysis is only as good as the analysis for each link in the chain, and ignoring some links – in this case the links that contribute most to the overall risk – is a substandard engineering practice that yields a nonsensical result.

To wit, a test of Buckman's auto-shutdown systems last week revealed an incompatibility between the sensors that detect toxic flows from the canyons and the systems that receive those signals to initiate an auto-shutdown. As a result, Buckman's operators must now shut down the system manually whenever it is suspected that toxins might be flowing into the river.

**In other words, one safety system assumed by ChemRisk to be infallible does not work at all.**

The actions of ChemRisk cannot be excused by claiming that all parties understood the limitations of their work, or that ChemRisk never claimed it was practicing engineering, or that the City didn't require engineering licensure. ChemRisk's substandard methods yielded a trivial result that was misrepresented as a risk analysis of an engineered system. Their report was sold, and its results reported to the media. The 80,000 users of Santa Fe's drinking-water system were told, without qualification, that contaminants from LANL pose no health risk. That is false.

Recent fires in the canyons above Buckman, which have already caused flows of toxics-laden ash into the river above the Buckman pumps, have only increased the risk that LANL contaminants will reach Santa Fe's water supply.

Charged with protecting public safety, the licensure board must reject the substandard work performed by ChemRisk, and mandate that a true risk analysis of Buckman be performed.

Sincerely,



Mark Sardella, PE