Glow-in-the-Dark Watch Dials, the First Toxic Tort Litigation, and the Birth of the Occupational Safety Movement

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It is hard to imagine that something as innocuous as a glow-in-the-dark watch dial could be the cause of terrible human tragedies, and be the source of a bitter environmental legacy that has been difficult, disruptive, and expensive to address.

The story begins in 1917 when the U.S. Radium Corporation opened a factory in the town of Orange, New Jersey. Its business there was to extract radium from ore to produce a paint that was luminous—that is, it would glow in the dark. Indeed, the brand name of the paint was “Undark.” As the United States prepared to enter the First World War, it contracted with U.S. Radium to produce glow-in-the-dark watch dials for American soldiers.1

Radium is the highly radioactive element identified in 1898 by Marie Curie—the first woman to win a Nobel Prize, and the first person (and the only woman) to win

The Power of Radium at Your Disposal

Twenty-three years ago radium was unknown. Today, thanks to constant laboratory work, the power of this most unusual of elements is at your disposal. Through the medium of Undark, radium serves you safely and surely.

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The next time you fumble for a lighting switch, bark your shins on furniture, wonder vainly what time it is because of the dark—remember Undark. It shines in the dark. Dealers can supply you with Undarked articles.

For interesting little folder telling of the production of radium and the uses of Undark address

RADIUM LUMINOUS MATERIAL CORPORATION
58 Pine Street
New York City
Factories: Orange, N. J.
Miners: Colorado and Utah

UNDARK
Radium Luminous Material
Shines in the Dark

To Manufacturers

The number of manufactured articles to which Undark will add increased usefulness is manifold. From a sales standpoint, it has many obvious advantages. We gladly answer inquiries from manufacturers and, when it seems advisable, will carry on experimental work for them. Undark may be applied either at your plant, or at our own.

The application of Undark is simple. It is furnished as a powder, which is mixed with an adhesive. The paste thus formed is painted on with a brush. It adheres firmly to any surface.

Advertisement for “Undark” radium materials.
one twice. In the early part of the Twentieth century many quack medical claims were made about radium, asserting that it could cure a variety of ills. In fact, it is extremely dangerous, causing cancer and other diseases. Its “daughter” decay product, radon gas (which occurs widely in nature), is second only to tobacco as a leading cause of lung cancer, causing some 21,000 deaths annually in the U.S. alone.2

U.S. Radium hired young women to paint the watch dials. Younger people tended to have the steadier hands needed for the fine work of painting the dials. Many young men were heading off to military service and, in any event, it was believed that women were better at this sort of task than men. The women used delicate, camel hair paintbrushes in their work. They would bend close over the watch dials as they applied the paint. Worse yet, in order to bring the paintbrushes to the fine point needed for this work, they would repeatedly lick the brush, ingesting radium paint as they did so. Some of the women also used the paint on their fingernails for a novel, glow-in-the-dark polish.

Within just a few years, many of the women began to suffer terrible diseases. Among the most painful and disfiguring consequences was “radium jaw,” or necrosis of the jawbones, which received some of the highest doses of radioactivity as the women pointed their brushes with their lips. It is not known how many of the 80 to 100 women employed by U.S. Radium died, but the number is probably high.

The gruesome story becomes even worse: it turns out the U.S. Radium company was keenly aware of the dangers of exposure to the radioactivity. Managers and chemists who worked for the company routinely used shielding and protective clothing when handling the material; but the women painting the dials were assured their work was safe, and were even encouraged to point the brushes in their mouths. Worst of all, the company engaged in a reprehensible campaign of disinformation, suggesting that the women’s ailments were attributable to syphilis, a sexually transmitted disease.

In 1925, the Essex County Medical Examiner issued a bombshell report officially linking the deaths of the U.S. Radium workers to their occupational radium exposures. In 1926, the company ceased its operations in Orange.

One severely ill former employee, Grace Fryer, decided to sue U.S. Radium. It took her nearly two years to find a lawyer willing to represent her. Eventually, four other former employees joined the lawsuit. When the case finally reached court in 1928, all five women were so sick they could not even raise their hands to take the oath. Before the case reached the jury the company settled with the five women, agreeing to pay each $10,000 (about $138,000 today), plus a $6,000 annual payment as long as they remained alive. The company also agreed to pay all their medical and legal expenses.

This legal action by the Radium Girls, as they came to be known, has a strong claim to be considered history’s first example of what we now know as a “toxic tort” lawsuit—that is, a personal injury claim based on exposure to a toxic chemical.

The notorious case and the publicity surrounding it were also important factors in the development of occupational health and safety standards and laws.3 (Radium paint continued to be used for

2  http://www.epa.gov/radon/health-risk-radon

3  There was no dearth of workplace horrors and tragedies to motivate the development of occupational safety and health legislation as the Industrial Revolution unfolded. Once again, Wikipedia provides a good first glance at the
watch dials into the 1960s, but the workers were properly trained and provided with protective equipment.

However, the unfortunate story of the U.S. Radium Corporation does not end there. During its 10 years of operation the company processed many thousands of tons of ore to extract the radium. The leftover waste—still dangerously radioactive—was simply dumped on the factory property and remained there for decades. But it gets even worse: much of the waste ore was given away to be used as backfill for residential construction projects, for use as aggregate to make concrete for sidewalks and foundations, and to fill in and re-grade low-lying areas in the surrounding communities of West Orange, Montclair, and Glen Ridge.

Many hundreds of residential properties were contaminated with radioactive materials, of which the homeowners knew absolutely nothing until the early 1980s. By the middle of the previous decade, Americans had finally begun to wake up to the deeply disturbing environmental legacy of our industrial past. Infamous sites like Love Canal near Niagara Falls in New York State spurred Congress to pass, in 1980, the Superfund law giving the U.S. Environmental Protection Agency (EPA) the responsibility to identify and clean up the worst of these sites.

The work has been hugely expensive, in addition to being disruptive to the affected residents and communities. Contaminated soil had to be excavated from hundreds of properties, while the residents were relocated to temporary living quarters. Some homes had so much radioactive waste material underneath that the only solution was for EPA to purchase the house, and demolish it to get at the wastes below. Tens of thousands of tons of these dangerously radioactive wastes had to be carefully handled by workers in cumbersome protective gear, containerized for shipment, and sent across the continent for disposal at specially constructed and permitted facilities.

The cleanup work has cost over $206 million in public funds. We will never know how many residents suffered health effects from their exposure, sometimes over many decades, to the radioactive wastes on which they were living. What we do know is that we owe a deep debt of gratitude to the unfortunate but brave Radium Girls, who used their last energies to expose the unforgivable actions of a callous employer, and lay the groundwork for safer conditions for workers.

The U.S. Radium factory site itself, and the contaminated properties in Montclair and Glen Ridge, were among the first generation of sites to be placed on the Superfund National Priority List, in 1983 and 1985, respectively. By that time, however, the company was out of business, so the cleanup work had to be paid for by federal and state governments.

history of such legislation, the earliest forms of which started in Europe in the 19th century. See https://en.wikipedia.org/wiki/Occupational_safety_and_health#History and follow the citations at the end for more details. The terrible story of the Radium Girls was, alas, one among many. But because of the successful lawsuit, and perhaps because the victims were young women, their story resonated especially strongly.


5 For a complete list of NPL sites and links to EPA’s fact sheets and related information for those sites, see: http://www.epa.gov/superfund/search-superfund-sites-where-you-live#basic
EPA Superfund cleanup of residential property tainted by US Radium wastes.
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