

Erin Allmann Updyke	"The situation in which the two doctors found themselves was more horrific than any war story or tragedy they might have read about. What I liked more than anything else about my profession was being able to relieve suffering, Gandhi would say. And there I was unable to do that. It was unbearable. Quite apart from hemorrhaging of the lungs and cataclysmic suffocation, he found himself confronted with symptoms that were unfamiliar to him. Cyanosis of the fingers and toes, spasms in the esophagus and intestines, attacks of blindness, muscular convulsions, fevers and sweating so intense that victims wanted to tear off their clothes. Worst of all was the incalculable number of living dead making for the hospital as if it were a lifeboat in a shipwreck."
TPWKY	(This Podcast Will Kill You intro theme)
Erin Welsh	This is going to be a tough episode to do.
Erin Allmann Updyke	Yeah, definitely.
Erin Welsh	Yeah. So that was an excerpt from a book called 'Five Past Midnight in Bhopal: The Epic Story of the World's Deadliest Industrial Disaster' by Dominique Lapierre and Javier Moro. And hi, I'm Erin Welsh.
Erin Allmann Updyke	And I'm Erin Allmann Updyke.
Erin Welsh	And this is This Podcast Will Kill You.
Erin Allmann Updyke	And today, like the book title suggests, we're talking about the Bhopal gas leak which is one of the most important stories that most of us have probably never heard of.
Erin Welsh	Yeah. I don't think I heard about it until a listener had reached out to us and written in and suggested this as a topic, maybe a couple of years ago at this point. And I jotted it down and then kind of went to the Wikipedia page just to get a feel for it. And could not believe that I hadn't heard of it, that this isn't in every history book.
Erin Allmann Updyke	Yeah.
Erin Welsh	That it's not just something that we know about collectively.
Erin Allmann Updyke	Right. Yeah. That's how I felt in researching this. Like how am I just now learning about this?
Erin Welsh	Yeah.
Erin Allmann Updyke	Yeah.
Erin Welsh	Yeah. And we're going to learn a lot today. But first things first-
Erin Allmann Updyke	It's quarantini time.
Erin Welsh	Feels weird to be doing this.
Erin Allmann Updyke	It does.

Erin Welsh: And I mean it often does, feels exceptionally weird in this case.

Erin Allmann Updyke: But tradition is tradition.

Erin Welsh: Tradition is tradition. And what are we drinking this week?

Erin Allmann Updyke: We're drinking The Poisoned Chalice.

Erin Welsh: So named because, as you can guess, contamination. Yep, you'll learn more about that later on. But what's in The Poisoned Chalice, Erin?

Erin Allmann Updyke: It's a not poison-flavored, delicious little beverage with a shrub that's made from like strawberries and thyme. And then you mix it with gin and lemon juice, maybe some fizzy water. And we'll post the full recipe for that quarantini as well as our non alcoholic placeborita on our website [thispodcastwillkillyou.com](http://thispodcastwillkillyou.com) and all of our social media channels.

Erin Welsh: Now it's website time. You can find lots of stuff on our website from [bookshop.org](http://bookshop.org) and Goodreads list, from our merch to Patreon, from sources for each and every one of our episodes, transcripts. There's a lot you can find, check it out.

Erin Allmann Updyke: So much. Check it out. So today's episode is a topic that's a little different than most of our typical episodes. And because of that, we're going to do things in a slightly less than typical order. So Erin Welsh is going to start out by taking us through the story of the Bhopal gas leak and what actually happened that night and since, and then I will catch us up with what the gas was that was predominantly leaked and how it affects the body and then kind of catch us up to where things stand today.

Erin Welsh: Yeah. It's a little bit wonky order but I think that it'll work for this episode.

Erin Allmann Updyke: Yeah. It'll make sense, we promise.

Erin Welsh: So should we just get started right after this break?

Erin Allmann Updyke: I think so.

Erin Welsh: Okay.

TPWKY: (transition theme)

Erin Welsh: We humans have been waging a war against insects and arthropods for millennia. They eat our grain, our corn, our rice, our potatoes, they transmit diseases to us and to our domestic animals. And even if their actions don't result in outright devastation as they often do, they can simply be annoying. Over the centuries, we've tried everything from prayer, rituals, and spells to selective breeding, physical removal, and more recently chemical applications like arsenic, copper sulfate, DDT, and Sevin. Anyone who comes up with a successful solution is handsomely rewarded with scientific prizes and gobs of money. And any company that manufactures that solution is certainly going to get their own share of riches. The development and use of these pesticides has truly revolutionized our world. It has prevented famines, increased food security, enabled food production where it had previously been impossible, saved countless lives by decreasing arthropod borne diseases like malaria. It has so often been a tool for good.

But of course the consequences of pesticide use are not all positive. Ecological cascades, die offs of already endangered animals, long term contamination of groundwater, untold and sometimes inadequately measured health effects on humans. It's definitely a tread carefully kind of situation and even treading carefully may not save you from the negative impacts that only make themselves known later on. But this is not a story about pesticides and the use of pesticides and weighing sort of the good and the bad. It's a story about the manufacture of them, of one of them in particular. And like so many stories about pesticides, this story features themes familiar to listeners of the podcast. Corporate negligence, the disregard of human health and human life, cutting corners to save a few bucks while eliminating safety features, a complete lack of consequences for those responsible, and the lingering devastation no longer seen as headline worthy that is still around today even decades after the problem first arose.

Erin Allmann Updyke

Yeah.

Erin Welsh

This is a difficult story to tell because I don't think that my 30 or 40 or maybe even 50 minute telling can really do it justice. And it's also a difficult story to hear. There is no shortage of suffering and death and injustice. And I recognize that many people might not feel like that's something they can be around right now. And so if that is the case for you, I might recommend saving this episode for a later date. All right, here we go. By the 1960s, the US industrial company Union Carbide was a household name. If you went to the grocery store, your groceries were most likely going to be packed up in Union Carbide plastic bags.

Any plastic bottle you took home, probably made by the company. Food packaging, film for cameras, any number of common household items was manufactured by Union Carbide and their products extended far beyond trash bags. Telephone wire, antifreeze batteries, rubber, synthetic diamonds, metallurgical items used in airplane turbines, industrial gasses like nitrogen, methane, and propane; ammonia and urea for use in fertilizers. I think it's hard to overstate the enormous, absolutely enormous range of chemicals and products produced by Union Carbide.

Erin Allmann Updyke

Wow.

Erin Welsh

And the scale at which they mined and processed and produced in order to supply the world, the entire globe, with their goods.

Erin Allmann Updyke

Wow.

Erin Welsh

One of these products was a pesticide called Sevin, which is shortened from experimental insecticide 77. And it's spelled, by the way, S-E-V-I-N. And this was developed in 1957. Sevin, Union Carbide claimed in its widely distributed pamphlets, was the answer to everything.

Erin Allmann Updyke

Everything.

Erin Welsh

A true silver bullet insecticide. Not only did it protect nearly every crop you could think of from nearly every species of arthropod you could think of, it also killed those insects that had developed resistance to other popular pesticides of the day and could be used around the house to kill mosquitoes and roaches as well as on pets to eliminate fleas, lice, and ticks. And it did all of this without harming humans, with proof given in the form of a photograph where one of Sevin's developers can be seen licking some granules of the substance.

Erin Allmann Updyke

I'm sorry. No.

Erin Welsh

I haven't actually seen the picture but that's how it was described in the book. But yeah, that was sort of like 'Sevin is so safe'. Whether or not Sevin in its final stage is truly non toxic to humans, I don't know. I found a couple of papers from the 1960s that didn't appear at least on surface level to be funded directly by Union Carbide that reported low toxicity to the mammals that they tested. But there was some toxicity to crustaceans and fish.

Erin Allmann Updyke

Okay.

Erin Welsh

But this story isn't even about Sevin. One of the intermediate chemicals used to make Sevin is outrageously toxic. And this is necessary for Sevin's production, right. So if Union Carbide wants to sell lots and lots of Sevin, which of course they did, they have to make lots and lots of this stuff. So basically to make Sevin, you put some chemicals together, you get a new chemical out of that called methyl isocyanate. This is the thing that we're interested in. And you add another chemical and then boom, you get Sevin. So part of getting Sevin ready for widespread production involved testing these various steps to see what safety precautions you needed. Do you need gloves? Do you need a chemical hood for this step? Do you need a respirator? So on. Well methyl isocyanate needed all of it. Quote: "When toxicologists had it tested on rats, the results were so terrifying that the company banned their publication. Other experiments had shown that animals exposed to MIC vapors alone died almost instantaneously." Endquote. Yeah.

Erin Allmann Updyke

Okay. I'm just listening so intently because I obviously read a lot about methyl isocyanate and I tried to read very little about the actual story itself. But I know a little and so I'm really very curious how... I just want you to keep going.

Erin Welsh

Like why?

Erin Allmann Updyke

Like I don't want spoilers but how things got to where they got to because... Yeah.

Erin Welsh

Oh yeah. There is an explanation but there is no logic to it and there's no 'oh yeah, that makes sense'. Every decision, many layers of decisions that were not in the interest of human health.

Erin Allmann Updyke

Okay, okay.

Erin Welsh

Yeah. And so this was like early on, this was sort of like okay, we found this pesticide, now can we scale up its production and make this a viable product for global distribution? And so that was why they were testing these various steps and somehow these results didn't scare off the company from making it. They're like it's fine. There were even some toxicologists in Germany who decided to enlist the help of quote unquote "voluntary human guinea pigs" to see what level of exposure to MIC was harmful. It didn't take very much, as you could guess.

Erin Allmann Updyke

Uh-huh.

Erin Welsh

Yeah. Making it even worse was the volatility of methyl isocyanate. If it comes into contact with a bit of water or some metal particles, it would undergo a powerful reaction resulting in a fatally poisonous cloud of gas that would severely injure, burn, blind you, if it didn't just kill you outright. This was all known. With this information in hand, they're like okay, well we can just make regulations around that to protect the workers that are working with this. We have to store it at a temperature close to freezing so that it doesn't explode. And there have to be a lot of safety backups in case something did happen like a leak or if water got in or some other contaminant. The manual that Union Carbide wrote describing methyl isocyanate said that it could be fatal if inhaled, it could cause severe chest pains and pulmonary edema, and that a vehicle that was transporting this highly volatile stuff needed to take back roads and go far around towns and cities. If there was a leak, you have to just hit the gas, drive to the middle of nowhere, and get out.

Erin Allmann Updyke

Oh my goodness. This is so horrific.

Erin Welsh

Yep.

Erin Allmann Updyke

Can I ask you a question? But I don't want to jump ahead if you're going to talk about this.

Erin Welsh

Yeah, yeah.

Erin Allmann Updyke

One of the things that I read about one of the ways that all of these things could have failed to lead to the thing that's about to happen, was that because MIC is essentially an intermediate product, that it didn't have to undergo the same level of safety testing as an end product. But it sounds like they knew a lot more than I realized.

Erin Welsh

Yeah. The health effects and the extreme risk that MIC posed was well known.

Erin Allmann Updyke

Okay. Wow.

Erin Welsh

Yeah. There's more, I'm just going to keep reading.

Erin Allmann Updyke

Yeah, keep going.

Erin Welsh

And so they had these regulations about like storage, about transportation, about fail safes, stuff like that. Because they knew that if there was a leak, if there was a release of this deadly gas cloud, that it could harm or kill anyone who breathed it. So you're putting not only those who worked near it at risk but anyone who lived near it was produced or held or transported. So it was known just how deadly the substance could be. But MIC could also make Union Carbide so much money, like so much money. So you just got to overlook that, right? The trick was just figuring out where to put a factory to produce this stuff so that you could make the end product that everyone actually cared about, Sevin.

The first of these factories was in West Virginia on the banks of the Kanawha River, I hope I'm saying that right, I apologize, if I'm not, outside Charleston. The second factory would be in Bhopal in the heart of India. The location for the second factory was not chosen at random. Union Carbide had long established links with the country, with 14 factories producing chemicals, plastic goods, film, laminated glass, batteries, and machine tools among other things. And pesticide production seemed like a natural next step, given the food shortages caused in part by crop pests that had occurred in the 1960s in India.

Not only would the factory create loads of jobs, it would also make affordable pesticide readily available. Plus Bhopal was centrally located in the middle of India and was connected to other cities by well maintained roads and a railway system. It's great, right? Plans to produce 5000 tons of Sevin were immediately drawn up and approved. But in order to manufacture that quantity, that enormous quantity of Sevin, the factory would have to first produce and store an enormous amount of MIC. The West Virginia factory was already doing this but that factory was operational 24/7, so it was producing Sevin around the clock and it was connected to other Union Carbide plants. And so there was a lot more monitoring constantly that was going on.

Erin Allmann Updyke

Okay.

Erin Welsh

Even though it was also located relatively close to Charleston where lots of people lived.

Erin Allmann Updyke

Okay.

Erin Welsh

The factory in Bhopal would be much smaller, it would only produce as needed, and it would be staffed by fewer people compared to the West Virginia factory. That meant that the 22,000-26,000 gallons of MIC would be stored for longer periods of time because you couldn't produce as much as fast and would not be able to be monitored as regularly. Just yep.

Erin Allmann Updyke

Already seeing some flaws here.

Erin Welsh

Oh yeah. One of the project leaders was concerned about the risks of such a factory and so he consulted with some experts who told him we only produce our methyl isocyanate as needed. We'd never risk keeping a single liter for more than 10 minutes. A single liter.

Erin Allmann Updyke

Okay.

Erin Welsh

And so they're talking about storing tens of thousands of gallons on site.

Erin Allmann Updyke

Okay.

Erin Welsh

Another person said quote, "Your engineers are out of their minds. They're putting an atomic bomb in the middle of your factory that could explode at any time." Endquote.

Erin Allmann Updyke

And this is before they built the factory.

Erin Welsh

Yes. I think at this point they were making Sevin but they weren't manufacturing MIC or even storing it there yet. So they were making plans to do this.

Erin Allmann Updyke

Okay.

Erin Welsh

The French government had prohibited MIC being stocked in any quantity larger than 20 gallon drums. Meanwhile for the Bhopal factory, they had plans for three tanks, each of which could house 10,000-20,000, like 18,000 gallons of MIC, each one. Union Carbide wasn't concerned about this. There's a quote: "You have absolutely no need to worry. Your Bhopal plant will be as inoffensive as a chocolate factory." Endquote.

Erin Allmann Updyke

Uh-huh.

Erin Welsh

I could almost buy this overconfidence or whatever it is if Union Carbide had never experienced an industrial accident. But they were certainly no stranger to them, especially those where proper safety or containment protocols were not implemented and adequate safety gear not provided. Silicosis deaths in hundreds of employees at a West Virginia mine in the 1930s, residents living in areas south of West Virginia factories developing cancerous tumors at twice the rate of the national average, asbestos mining in California through the 1980s and maybe beyond leading to mesothelioma and other asbestos-related disease in many employees, widespread contamination of groundwater and soil with pesticides and herbicides in Australia, and many other places where they had their plants and mined for decades. But Union Carbide seem to take these incidents in stride. They weren't going to let a few pesky cases of cancer or ecological devastation stop them from conducting business the way they wanted. But local regulations in India prohibited any industry that produced toxic emissions be set up near densely populated areas. Under this regulation, that factory proposed to be built in Bhopal should not have been allowed, right.

Erin Allmann Updyke

Yeah.

Erin Welsh

Because you're producing toxic emissions. Wrong. That regulation could only be enforced if you admitted to the presence of toxic gas in your building application, which Union carbide took great pains to conceal. They did not indicate that they would be storing the incredibly deadly methyl isocyanate on factory grounds next door to the hundreds of thousands of residents of Bhopal.

Erin Allmann Updyke

And is that like they were wordsmithing it? Because oh Sevin, I licked it, it's not toxic, that's what we're producing.

Erin Welsh

That's my guess.

Erin Allmann Updyke

Yeah.

Erin Welsh

That's my guess, yeah. It's like technically if we're containing MIC, there is no toxic emissions.

Erin Allmann Updyke

Yeah, right.

Erin Welsh

So I mean it's a lie of omission, I guess.

Erin Allmann Updyke

Right.

Erin Welsh

I don't know the documentation precisely but...

Erin Allmann Updyke

Okay.

Erin Welsh

Construction on the factory began in 1972 as planned. And at first the thousands of gallons, the tens of thousands of gallons of MIC that were needed weren't produced on site but had to be transported over 500 miles to where the factory was, which was extremely dangerous, right. The boiling point of MIC is 39°C which is not very hot and so on hot days there was always the worry of explosion, not to mention like what if there was a car accident? But after six years of this transportation, the equipment to produce and store MIC on site, 120 tons of methyl isocyanate, enough methyl isocyanate to poison half of Bhopal was finally finished on May 4, 1980.

Of course MIC was not the only dangerous substance to be in ample supply at the factory in Bhopal. There were early signs of water pollution like extreme and deadly contamination where cows died, the water smelled bad and was weirdly colored. But allegedly nothing was done about it besides compensation for the cows. There were safety measures in place for a potential MIC leak, there's a siren and loudspeakers that would announce a leak and order evacuation. There was a wind sock that would show which direction the gas would be blowing. There were drills that were regularly practiced, safety equipment that could be used to revive a few people if they had been exposed, safety posters, as well as equipment-specific fail safes that were supposed to provide multiple layers of protection or at least a warning in case of a leak. And I'll get more into those in a bit.

But these safety measures applied only to the factory and those working there, there was no plan for how to inform Bhopal's residents of a fire or a toxic leak at the factory. The sirens and the instructions from the loudspeakers, they didn't travel very far. And so maybe some people on the edge could hear the sirens but like in terms of evacuate the area, there's a toxic leak, no.

Erin Allmann Updyke

Oh okay.

Erin Welsh

And when the lead engineer at the factory asked for help from local authorities to at least get people to move like farther from the factory grounds, the local authorities refused because they were worried that people would leave and elections were coming up.

Erin Allmann Updyke

Okay.

Erin Welsh

Throughout the first few years of full operation, factory operators had several opportunities to test out these new safety measures and patch any holes they found, figuratively and literally. In 1982, an employee got a few drops of MIC on his sweater when he was doing a repair. He immediately hopped into the shower and rinsed off but he took off his gas mask prematurely.

Erin Allmann Updyke

Oh no.

Erin Welsh

And when the water had hit the MIC on his sweater, it created this cloud of toxic gas and he died a few days later.

Erin Allmann Updyke

Oh no.

Erin Welsh

Yeah. Not too long after this, just a few months, 25 workers were poisoned from a leaky phosgene pump. They all survived but even this was not enough of a wake up call because about eight months later, a huge cloud of MIC vapors escaped after some pipes failed. The sirens went off and everyone was ordered to evacuate the factory. But Bhopal's residents who could hear the siren had no idea what to do or if they should worry. Is this just a drill or is this irregular? Fortunately the gas dissipated before it could reach their homes and no one was injured in that particular instance. But still, you would hope that these near misses and a death-

Erin Allmann Updyke

Close calls.

Erin Welsh

Yeah. Would inspire someone to look around and go 'I think that we need to maybe make this safe for everyone, like we're not doing a good enough job here'. But no, at least no one in charge. There was a journalist who toured the factory after that person had died of MIC exposure and he was hit with like the smells of chemicals which I feel like that indicates that something is not right. Like you shouldn't be smelling these toxic chemicals. There was like the odor of phosgene, which smells apparently like freshly cut grass, and methyl isocyanate, which smells of boiled cabbage, I've seen it described.



And this journalist investigated these chemicals further and grew even more horrified by what he found. Quote: "Merely appreciating that methyl isocyanate and phosgene are 2.5 times heavier than air and have a tendency to move along at ground level in small clouds was enough to make me realize at once that a large scale gas leak would be disastrous. After detailed examination of the safety systems in place in the plant, I knew that tragedy was only a matter of time." Endquote. Yep. And he published his concerns in local newspapers with headlines like 'Bhopal, we are sitting on a volcano' and 'If you refuse to understand, you will be reduced to dust', to no avail. An internal audit of the safety of the factory found over 60 breaches of operational and safety regulations. A lack of pressure gauges, positioning of equipment that could trap people in case of a leak, no sprinklers, ruptures in pipework, turnover of staff and improper training, I mean the list truly goes on and on.

Erin Allmann Updyke

Oh no.

Erin Welsh

Uh-huh. But again, no meaningful change was made. If anything, the situation grew worse. Because Union Carbide's business wasn't doing well. The factory and Sevin wasn't performing as they had hoped. Widespread drought throughout the region meant that there was no point in applying pesticides to plants that weren't growing and many people had just stopped buying pesticide altogether because it was effective for just such a short period of time. The amount of Sevin sold was half of production capacity and dropping drastically every year.

Erin Allmann Updyke

Oh no.

Erin Welsh

And the newly appointed director of the plant, who I think was appointed in early 1984, who had zero experience managing a chemical factory by the way, made extreme cuts to try to reduce losses. Personnel reduced nearly half, skilled personnel replaced with less expensive, untrained personnel, fewer quality control checks, fewer maintenance procedures, replacing parts less often, replacing parts with cheaper versions, not replacing parts at all. Just every single corner that you could think of, just like imagine a thing that has lots of corners and cut every single one of those corners right off.

Erin Allmann Updyke

It's just very circular now.

Erin Welsh

It's a circle, yeah.

Erin Allmann Updyke

Yeah.

Erin Welsh

And when that wasn't enough, when those cuts were deemed not good enough, management decided that the factory would go into operation on an as needed basis. And since it was only as needed, then all of the principal safety systems could be shut down unless the factory was up and running. Because it's not like an accident could happen if the factory wasn't operating, right?

Erin Allmann Updyke

Oh no.

Erin Welsh

Wrong obviously, that's why we're doing this episode. One of those safety systems that had been shut down included the refrigeration of the 60 tons of methyl isocyanate that was still sitting in the tanks which was supposed to be kept at 0°C. The cost cutting also put out the flame that burned day and night to burn off any toxic gas that escaped, saved a few bucks on coal expenses. And the deactivation of an enormous scrubber cylinder that was meant to decontaminate gas leaks also saved the company some money. But it wasn't enough. In August 1984, Union Carbide wrote off the plant entirely and made plans for its liquidation. That meant no more repairs or replacements and the factory fell into more and more disrepair by the time December 1984 rolled around.

At this point, the only remaining safety device for the methyl isocyanate tanks was the windsock that would show which direction any toxic gas cloud headed. That's it. With the refrigeration off, the MIC in the tanks was reaching the December ambient temperature of 20° C. And even more concerning, the 63 tons of methyl isocyanate still at the plant was not evenly distributed among these three tanks. One tank held 42 tons which was almost full, against regulation, because they were supposed to be left about 50% full and then held in place with inert nitrogen so that in case there was a chemical reaction that started, you could inject a solvent and have enough room in there to house that solvent to stop, to shut down that reaction.

Erin Allmann Updyke

Okay.

Erin Welsh

But if it's full, you can't, there's no space for that solvent.

Erin Allmann Updyke

You can't do that.

Erin Welsh

Another tank that was supposed to be left empty in case of an emergency, like in case like oh we have too much in one tank-

Erin Allmann Updyke

We need to offload.

Erin Welsh

Yep. That had a ton of MIC already in it. None of these tanks had been inspected since at least October, like for two months, which was when production shut down entirely. And MIC, as we have emphasized, is not an inert substance. If all this wasn't enough, the pressurization system on the tanks was broken. So instead of keeping that MIC from moving or expanding or anything else from escaping in there because if it's pressurized, nothing can come in; that pressurization was broken. And so contaminants could get into these tanks with no resistance at all. And if contamination got into the tanks, that would trigger a massive chemical reaction. And so this ticking time bomb of a factory sat outside the unsuspecting city of Bhopal on the night of Sunday, December 2, 1984. But before I go into the details of that night, let's just take a little bit of a break here.

Erin Allmann Updyke

Yeah.

Erin Welsh

And we'll be back in a few.

TPWKY

(transition theme)

Erin Welsh

Where I left off was talking about this ticking time bomb of a factory that sat outside Bhopal on the night of Sunday, December 2, 1984. That Sunday was not a typical Sunday for Bhopal. It marked the beginning of the celebration of Ijtema, a prayer gathering that brought thousands of people from all over the country to Bhopal, increasing the city's population to enormous numbers, close to a million people in one estimate. Celebrations were in full swing in town while at the factory, only about 120 people remained on site, mostly just keeping an eye on things and doing some light maintenance like flushing out the pipes connected to the MIC storage tanks.

Erin Allmann Updyke

Oh no.

Erin Welsh

And this flushing was important to make sure that there were no contaminants going into the MIC tanks, right. And the flushing seemed to go okay, except for one drainage pipe that wasn't draining. And the guy doing the flushing was like this doesn't seem right. And so he went to ask his supervisor to come and take a look because he was worried that like okay, if I'm not seeing this water being flushed out, where is it going? Is it going somewhere it shouldn't be going? The supervisor was like ugh, it's fine, don't worry about it, relax. And it appeared to be fine for I don't know exactly how long but for a chunk of time, like nothing seemed to result. Until close to midnight when the smell of boiled cabbage began to fill the factory.

The water that was supposed to come out of that rinse pipe during the flushing had instead gone into the tank that was almost full, that contained 42 tons of methyl isocyanate. And the water which is a problem alone because it reacts with methyl isocyanate, it wasn't just pure water. It brought with it debris, sodium chloride crystals, and many other impurities. And the introduction of this contaminated water set off an explosive reaction. At five minutes past midnight on December 3, 1984, geysers of methyl isocyanate erupted from the tank, filling the air with a cloud of deadly gas 100 yards wide and heavier than air, which according to the windsock, the lone remaining safety device, was headed directly to town as well as the train station where hundreds of people waited.

The factory siren could barely be heard over the celebrations or while people were sleeping but there was no context or explanation given even if you could hear the siren. Like was this a drill? Was this anything to worry about? And after 10 minutes it went silent, which people took to mean that it was probably just a drill and there was no real danger. But really the siren had recently been adjusted to do that, to ring for 10 minutes and then switch to a quieter one that was heard only within factory grounds so that instructions could be more clearly heard through the loudspeaker.

Erin Allmann Updyke

Okay.

Erin Welsh

Yeah. And so people at the factory had already, whoever could, had already abandoned, they had run as far and as fast as they could away from this. And any relief that people felt after hearing that alarm go silent in Bhopal, it didn't last for long because the smell of boiled cabbage soon found its way into the city. The pungent air swept through wedding celebrations, through homes with newly born babies, through the bustling markets, through fields of cows, through the crowded train station, through the open windows of bedrooms with unsuspecting sleepers. Everywhere the gas cloud reached, it left death and destruction in its wake. If in your first breath you caught the scent of cabbage, the second one was likely to leave you gasping, choking, coughing. People died where they stood, where they slept, where they danced, and especially while they ran, as they breathed more and more of the toxic gas in faster and deeper. The noisy streets were filled at first with panicked shouts and cries and then with horrible coughing as more and more people, dogs, and cows collapsed from the poisonous gas that had flooded their lungs.

Trains packed full of hundreds of passengers continued to arrive at the station where the deadly gas had settled with the platform already filled with the bodies of the poisoned. If you fell, there was most likely no getting up since the heavy cloud settled close to the ground, displacing any breathable air. There seemed to be no escape from this horror which was a horror beyond comprehension, like I cannot comprehend it. And there was no guidance or even answers, like an explanation, anything as to what was happening. Only a few people knew about the explosion at the factory and so no one could take steps to protect themselves or their family or anyone else from the gas. And how would you even go about doing that anyway? There had been no contingency plan for something like this. And while this was happening, while this gas was spreading through the town, there didn't seem to be any attempt to make people aware, only to conceal what exactly was happening.

Physicians who were at the rapidly filling hospitals tried to call local authorities to figure out like okay, what poison are we dealing with? So we could at least treat appropriately or administer an antidote if one exists. But they were told flat out lies or at least a watered down version of the truth. They were told it was not methyl isocyanate but something else like ammonia poisoning. They were told that it was oh just a few inconsequential poisonings, nothing really serious, a few damp compresses and everything should be all right. Not a deadly gas, just irritating, a sort of tear gas. Just give them some water to drink and rinse their eyes with. And that one, that last one came from Union Carbide's doctor.

Erin Allmann Updyke

Oh no. Oh no.

Erin Welsh

These descriptions, nothing really serious, just a few inconsequential poisonings, this did not match at all with what the doctors were seeing at the hospitals where dozens of people lay dead and dying along the hallways. But even knowing that it was methyl isocyanate didn't help the doctors who had never heard of the stuff. They did the best they could, providing water or oxygen or cardiac massage or a few drops of atropine and a damp cotton pad for the horrific eye injuries that people were coming in with. But they were too late, they couldn't have gotten there early enough. And on the morning of December 3rd, the sun rose over a city that had been completely transformed by tragedy and chaos. Bodies of people and cows and dogs, anything that breathed, filled the streets. The official death toll for that first night stands at around 3800.

Erin Allmann Updyke

From the first night?

Erin Welsh

From the first night. And there are other estimates because there was not a very comprehensive tally made, which would have been like nearly impossible to do so just with everything that was going on. And so there are other estimates that put the number of people killed that first night and over the next few days at 10,000, 15,000, even 20,000 people. And that's not even taking into account the number of people injured, some permanently, that night and the countless health effects that they experienced later on, which number more than half a million people in total. And it doesn't also take into account the contamination that remains at the site of the factory to this day, still making people sick. As cleanup began in the days after the explosion, clean up by the way not of the poison but of the bodies of those who had died, Bhopal's surviving residents demanded answers. How had this happened? Who was responsible? And why had no one been warned? The CEO of Union Carbide, Warren Anderson-

Erin Allmann Updyke

I already hate it so much.

Erin Welsh

I know. Yep. I mean it just doesn't get better.

Erin Allmann Updyke

No, I know.

Erin Welsh

Like this is a horrible story through and through. So Warren Anderson at first seemed to be prepared to take some responsibility, to communicate transparently with the press, and to provide financial aid to those affected by the explosion. But he quickly changed his tune when he arrived in India and was arrested. I think he wanted to be hailed as like the hero who was going to come in with like clean up funds and stuff like that.

Erin Allmann Updyke

Okay.

Erin Welsh

There is some speculation that his arrest was largely symbolic anyway because his bail was set at like \$2000 and there were more than a few government officials involved in the explosion or at least in like shoving these safety issues under the rug. But in any case, there was no more playing nice for Warren Anderson. Anyone outside of Union Carbide was forbidden entry to the factory and forbidden access to any documents that would give some clue as to what had happened. And Union Carbide began peddling a story that the explosion was intentional, orchestrated by a disgruntled worker bent on sabotage. And so this was so that the company wasn't responsible.

Erin Allmann Updyke

It wasn't my fault.

Erin Welsh

No, it was just this disgruntled worker.

Erin Allmann Updyke

Just one dude.

Erin Welsh

It was only through the work of independent investigators that the true story came to light. One investigator found a Union Carbide internal report written just months before the Bhopal disaster that described a hypothetical scenario that could happen at the West Virginia plant, which was very similar to the Bhopal plant, in which a quote unquote "runaway reaction" involving methyl isocyanate could happen and the horrible tragedy that could result. This was just a few months before this happened. Even with this documentation clearly demonstrating that the company itself, not some lone disgruntled worker, was responsible for this disaster through negligence and the prioritization of profit over human lives, Union Carbide fought tooth and nail against these allegations. Ultimately in 1989, 5 years after the disaster, the company agreed to settle for \$470 million which was six times less than the \$3 billion that the Indian government had initially demanded. And they settled on the basis that no further charges could be made and that cleanup was not required to take place. They didn't have to clean up anything.

Erin Allmann Updyke

500,000 people affected. It's just, I can't.

Erin Welsh

Yep. Yep. I think when all was said and done it came down to the equivalent of \$600 US for each of those roughly 550,000 survivors affected by the explosion. And it was years before anyone actually received any of this money and even then they often ended up breaking even or nearly even because they had to pay for legal fees and for forms to certify that they were owed this money, like death certificates or medical forms or like no, I swear I was there. It's like yeah but can you prove it?

Erin Allmann Updyke

Wow.

Erin Welsh

Union Carbide CEO Warren Anderson retired quietly and lived out the rest of his life peacefully, at least as far as I can tell, with the arrest warrant from the Indian government never served to him. The company never recovered from the bad press of the Bhopal tragedy and the leaks that happened in 1985 in their West Virginia plant that ended up poisoning some workers. And in 1999 Union Carbide was sold to Dow Chemical Group. Dow immediately washed its hands of the Bhopal disaster with CEO Frank Popoff declaring that quote "it is not in my power to take responsibility for an event which happened 15 years ago with a product we never developed at a location where we never operated." So like even though technically they own the factory and the factory grounds I assume, I don't know if that's the case, they're not responsible for the cleanup.

Erin Allmann Updyke

Nope.

Erin Welsh

And so that's the justification that they used to let the plant in Bhopal continue to sit there decaying, contaminating the water and soil and making a whole new generation sick. And in one night Union Carbide erased the rich cultural history of Bhopal, turning it into a city with one identity, that of poisoning and suffering. Not talking about the arts and the poetry and the music and anything that is so unique and wonderful from this region. It's now Bhopal is just Bhopal disaster.

Erin Allmann Updyke

That was something that I kept coming back to. Like why isn't this called the Union Carbide disaster? Like this is a Union Carbide leak. And one single paper that I read referred to it as such and all of the rest of them don't. And it very much feels like how you're not supposed to name a disease after a place.

Erin Welsh

Yes!

Erin Allmann Updyke

Like why are we naming this after the place and not the company who did this?

Erin Welsh

Yeah.

Erin Allmann Updyke

Like this is the Union Carbide leak.

Erin Welsh

Maybe it's because there were so many Union Carbide industrial disasters that you have to specify in another way. This is the 1984 Union Carbide disaster.

Erin Allmann Updyke

Yeah.

Erin Welsh

Yeah.

Erin Allmann Updyke

It's horrific. It's so horrific.

Erin Welsh

It is so horrific. And I think for listeners of the podcast, this story is a sadly familiar one. Profits over human health, companies withholding vital information that prevented people from making informed decisions, learning about the health effects of substances because of illegal or at least unethical exposures via corporate negligence. It just rings so many bells that we have rung before or something.

Erin Allmann Updyke

Yeah.

Erin Welsh

But yeah, I mean despite how familiar this story may be at least thematically, I can't believe that it's not more widely known, especially given that it's not over.

Erin Allmann Updyke

Right.

Erin Welsh

The 1984 Union Carbide disaster is still affecting hundreds of thousands of people today. Which is my cue to turn it over to you, Erin, to take us through exactly what this methyl isocyanate does to us and how we're still dealing with its effects.

Erin Allmann Updyke

I will do my best to do so after a short break.

TPWKY

(transition theme)

Erin Allmann Updyke

Erin, you took us through what happened during the Union Carbide gas leak in 1984. So now the question that I want to answer is what the heck is MIC or methyl isocyanate?

Erin Welsh

Yeah.

Erin Allmann Updyke

And what was happening to the people who lived in Bhopal that night? And of course what is still happening today? So to get at all of those questions, we're first going to focus on MIC, methyl isocyanate. This is the gas that was predominantly involved in this leak. And I say predominantly because as you mentioned Erin, there was not only just more than this one chemical present in the factory, but because of how reactive methyl isocyanate is, it's difficult to quantify exactly what else individuals could have been exposed to. So it's very likely that during the process of the leak and thereafter, residents were exposed to a number of other harms besides just methyl isocyanate.

Erin Welsh

Just pick your poison.

Erin Allmann Updyke

Right. But for the sake of simplicity and because the vast majority of papers focused on this, we'll focus on MIC today.

Erin Welsh

We've picked our poison.

Erin Allmann Updyke

Exactly. So let's first define what the heck substance we're actually talking about. Isocyanates are chemicals that are a nitrogen double bonded to a carbon double bonded to an oxygen. They have an NCO group.

Erin Welsh

Okay.

Erin Allmann Updyke

These groups themselves are highly reactive and they're used as intermediates in a lot of different manufacturing process, including making foam, plastics, adhesives, pesticides, paints, a whole bunch of different things. And there are a lot of different types of isocyanates. There are diisocyanates that have two of these NCO groups and there are mono isocyanates which have just one. All of these compounds cause some degree of toxicity and especially pulmonary or lung toxicity. The one primarily involved in the disaster at Bhopal was methyl isocyanate. So that means an NCO group attached to just a plain old methyl group which is a carbon and three hydrogens.

Erin Welsh

Okay.

Erin Allmann Updyke

So that makes this one of if not the smallest of these isocyanate compounds. And as we now know, the most reactive and the most toxic of the isocyanates. So MIC, as I'll call it for probably the rest of this episode, is a colorless liquid that is incredibly flammable, as you mentioned Erin, and very easily evaporates when it's exposed to air. It has an incredibly high vapor pressure, so it's very easily vaporized, and the vapors as the liquid are incredibly toxic. And you mentioned a lot of times, Erin, this very pungent odor. But it turns out that the concentration at which the odor is detectable is actually far above the threshold at which it can begin to cause damage. So it's causing damage before you even know that you're being exposed to it. This is called having poor warning properties which makes a toxic compound even more dangerous.

Erin Welsh

Yep.

Erin Allmann Updyke

And as we kind of alluded to during your section Erin, because MIC was used as what's called a captive intermediate in a quote "closed production process", it wasn't as thoroughly evaluated in terms of the potential health effects on humans as other chemicals may have been, except as we learned Union Carbide did plenty of work on this and hid it. But in any case, it wasn't until after this absolute catastrophe that the scientific community at large really started studying in detail the potential health effects. And as we'll see, we still fall woefully short. So to recap, on that night in December of 1984, it's estimated that 30-40 tons of MIC, that's over 25,000 kg of MIC as well as 12,800 kg of other reaction products were released.

And what likely happened when that water entered the storage tank, it caused an exothermic reaction that generated a lot of heat and eventually the explosion that led to this leak. And while as you mentioned the estimates vary widely, by morning thousands of people and animals were dead and thousands more were streaming into local hospitals. It's estimated that over the next few days, and that part is important, over the next few days tens of thousands of people likely died. And estimates continue that likely an additional 15,000-20,000 if not more premature deaths happened over the next few decades and 500,000 people were exposed, which means that we don't even know how big the effects could be. And we'll get there.

So let's go over what was happening to people who were exposed on that night. What were these acute health effects that we see from exposure to MIC? There are three major body systems that are affected with exposure to MIC, we now know, but this is something that affected people throughout their entire body, like every organ system. But the two most noticeable up top were the eyes and the lungs. And very shortly thereafter we found it also causes significant damage to the reproductive system.

Erin Welsh

Right.

Erin Allmann Updyke

So let's talk about it. Acutely with the eyes it was severe watering of the eyes, like profuse, profuse watering, photophobia, like not being able to open your eyes and look at light because of extreme pain, and very significant edema and swelling of the lids. The kinds of symptoms that you might think you'd experience if you've got a very caustic chemical or chemical vapor into your eyes. All of this would have been incredibly painful. And slit lamp examinations, which is when you can take a look actually into the eye itself showed ulcerations of the cornea. And over time, over weeks, this progressed into re-epithelization. So basically this cornea had been damaged enough that it had to have new growth, the cells of the eyes had to grow anew. Now the good news is that almost every report that I read suggested that the long term damage to the eyes was likely very minimal. There are some studies that suggested that people had long term issues with recurrent eye infections and excessive watering but no long term blindness or irreversible damage to the eyes as far as we know based on this incident.

Erin Welsh

Okay.



Erin Allmann Updyke

But the acute damage was significant. The most damaging however was to the respiratory tract and this is what caused the deaths of so many thousands of people. The damage to the respiratory tract was by far the most significant and the descriptions are honestly a little too horrific to go in in detail.

Erin Welsh

Yeah.

Erin Allmann Updyke

But exposure to high concentrations of this vapor, of this gas, would have resulted in breathlessness, nose and throat pain, difficulty breathing, and essentially an acute respiratory distress syndrome or ARDS, which we've talked about a little bit on this podcast before. But it is essentially what happens when you just can't breathe anymore because your lungs are filling up with fluid. And what we see in the autopsy and the pathology reports is complete destruction of the lung tissue itself. People who died from MIC, their lungs weighed 2-3 times as much as a typical lung would have weighed because of how full of fluid they became.

This fluid was a combination of hemorrhage, just bleeding, and also necrosis, tissue death, and lots of inflammatory fluid and cell infiltrates from people's bodies trying as best they could to do something about these vapors that they were being exposed to. It's horrific. In the slightly more longer term, like in the next few weeks and months, it also became very evident that there was significant effects on the reproductive system. Almost half of pregnant people who were exposed at least who were able to be followed during this incident did not give birth to live babies. That was a spontaneous abortion rate of three times as high as the estimated incidents in that same area prior to this event.

Erin Welsh

Oh my god.

Erin Allmann Updyke

And in a cohort that was able to be followed thereafter, the neonatal death rate was 15% compared to 2%-3% in that same population in previous years.

Erin Welsh

Oh my god.

Erin Allmann Updyke

Yeah. Additionally there were significant birth anomalies including spina bifida, limb deformities, heart disease, lung disease, even in infants who did survive. And then of course there are reports especially from kind of the night of and in the days that followed of a lot of other possible effects. Neurologic symptoms like seizures, loss of consciousness, muscle weakness or spasms, nausea and vomiting from damage to the GI tract. Like every possible organ system could be and likely was affected in some individuals by this event. And that's because as I'm about to get into, methyl isocyanate essentially just ripped through people's bodies. So how did this happen? How does this happen? What does this chemical actually do? It's very disappointing to say that we don't have a detailed answer. Like in our episodes where we've covered other chemicals or heavy metals, like in lead and in mercury, I was able to give quite a lot of cellular level detail of what is this thing doing in our bodies and how does it make us sick the way that it does.

Erin Welsh

Right.

Erin Allmann Updyke

This event, despite killing so many thousands of people and affecting so many hundreds of thousands more, we still don't quite know what MIC is doing inside of our bodies. There are two main hypotheses and both of these likely played roles and their effect sizes likely differ significantly based on the concentration of gas to which someone is exposed. The first is the most straightforward and easy to understand and what likely happened to the people who died that night and in the days thereafter. And that is that this is a chemical that is ripping through our cells. Because this compound is so incredibly reactive and it's incredibly reactive with water of which our bodies are mostly made, the reaction that MIC produces with water is exothermic and it generates heat. So whenever it's coming into contact with our mucus membranes, our wet, wet bodies and our water-filled cells, it's liberating heat and physically destroying our tissues.

So that is one main way and likely as I said the culprit of a lot of the acute symptoms, like the excessive watering of the eyes, eye pain, throat pain, the difficulty breathing. This is a chemical irritant that's just breaking open and killing the cells of our mucus membranes, of our lungs, of our GI tract, anywhere that it's getting to, right. So that could account for a lot of the respiratory symptoms and a lot of those initial deaths. And one thing that I think is important because when this event first happened, there was a lot of like you said confusion, what was the chemical that was causing this? And there was some thought that could it be hydrogen cyanide? So cyanide or CN instead of an NCO and hydrogen cyanide specifically, which is just hydrogen and a cyanide group, is an extremely toxic compound. Though as it turns out, methyl isocyanate is far more toxic per concentration than cyanide. Okay.

Erin Welsh

Oh my god.

Erin Allmann Updyke

But this is something that is in fact generated in some reactions from methyl isocyanate. So it was hypothesized that maybe it was cyanide that was the main culprit and not MIC. But one important part of this story is that many of the deaths happened in the coming days after the initial explosion. And cyanide poisoning happens in a matter of minutes.

Erin Welsh

Right.

Erin Allmann Updyke

When people are poisoned with cyanide, as we learned in our Tylenol episode, they die within minutes to hours. It's very rapid. Because the way that cyanide kills is by shutting off one of the enzymes that allows us to use the oxygen that we breathe. So our cells become asphyxiated because even though we're breathing, we can't use that oxygen. So if you survive the first few hours after a cyanide poisoning, then you'll probably survive no problem. That's not what we saw after this incident. We saw people dying for days and weeks. So methyl isocyanate initially causing damage to our lungs directly could have killed people outright with ARDS. But it also could have caused damage to the lungs that resulted in a continued inflammatory reaction in response to that tissue damage, that is why you see deaths happening in a kind of more prolonged delayed way.

Erin Welsh

Right, it's like the lungs could not recover, continue to get inflamed, continue to fill up with.

Erin Allmann Updyke

Exactly.

Erin Welsh

Yeah.

Erin Allmann Updyke

Even after that. But there is a second way that could also account for a lot of the damage that we see due to MIC, methyl isocyanate. And that is that it reacts with a bunch of other stuff inside of our cells as well. And this is where we disappointingly do not have all the answers. MIC after this event has now been shown to alter and inhibit the function of a number of different enzymes that are important for our life, like ATPase bound to our red blood cells to make ATP or break it down. It has been shown to impair cellular respiration in our mitochondria. It has been shown to interact with enzymes that end up increasing the coagulability of our blood within our vascular system. It has been shown to induce enzymes that activate our complement system which then cause a lot more inflammation. And it's also thought that it could even in our cells result in the production of hydrogen cyanide in our cells and then cause toxicity from hydrogen cyanide in that way.

Erin Welsh

What?

Erin Allmann Updyke

Yeah. It's also thought that it can conjugate to a substance that's found throughout our bodies but in especially high concentrations in our lungs called glutathione. And that perhaps conjugation to that stabilizes it enough to cross over our alveoli and into our bloodstream and thereby have longer term effects on our other organs as well. But we don't really know, like all of this is from animal model studies and cell level studies, like in vitro studies. But we still don't really know what was happening in Bhopal during this leak inside these human bodies and thereafter, and we especially don't know the extent or mechanisms of the long term effects of this.

Erin Welsh

How could it do so much, Erin?

Erin Allmann Updyke

I think largely because it is highly reactive. So it just is able to, depending on kind of what it's reacting with and what it's attaching itself to, it could have a really wide range of effects, right?

Erin Welsh

It's terrifying.

Erin Allmann Updyke

It's terrifying. I know, I know. And that's just kind of in the acute setting, right.

Erin Welsh

Right.

Erin Allmann Updyke

When it comes to the long term effects, we really don't have a good handle on what they are. Ocular-wise, like I said, the one good news is that there seems to be minimal long term damage in survivors in terms of blindness or vision loss. Respiratory system-wise however there is significant evidence for chronic lung disease of all stripes. We see in survivors from this disaster a lot of chronic lung disease, primarily of obstructive type. So symptoms similar to what you think of with COPD or asthma. And this was from data collected from survivors especially in the first few months and years after the event. And it's thought that a large part of this damage is due to that initial tissue damage that led to fibrosis in the lungs.

Erin Welsh

Okay.

Erin Allmann Updyke

And a really wide ranging pattern of different types of this chronic lung disease. More recent studies have shown increases in various cancers including lung cancers. But the data is sparse. Like really, really sparse. In terms of reproductive health, there is a lot of evidence for long term damage both in those who were pregnant at the time of the incident or in people who were of reproductive age and capable of pregnancy at the time of the incident. There was increased rates of unsuccessful pregnancies for years thereafter and an increase in other gynecologic abnormalities like pelvic inflammatory disease, leukorrhea which is abnormal discharge, and abnormalities in menses. There's also evidence, though it's sparse, of long term immunologic effects including reductions in cell mediated immunity. But it's very unclear what kind of an effect this actually may have on people in terms of disease or risk of disease or risk of cancers, etc.

Part of the reason that we have so little data on the long term effects of this, there's a lot of reasons, but there was an organization which was set up in the years after this disaster that was called the Bhopal Gas Disaster Research Center. And they initially registered over 80,000 people who had been exposed to MIC during this incident and another 15,000 or so people that had not been exposed in order to try and do longitudinal cohort studies of like what we might see in terms of long term effects. But several years later, by the time they actually started collecting data, they had already lost tens of thousands of people to follow up because they had moved or left or just perhaps died, who knows? Lost a follow up. And by 2010, only 16,000 people from that initial cohort remained, which is an 80% loss.

Erin Welsh

Wow.

Erin Allmann Updyke

So even though there's some data, it's really, really difficult to draw any valid conclusions from this data because of how many people are not represented. And even their initial cohort was a very small subset of people who were actually affected by this disaster. So while there is also some data that suggests increases in various quote "neurologic or psychiatric conditions", so this is anything from things like tremors or paresthesias on the neurologic side but also anxiety, depression, PTSD on the psychiatric side, we have an appalling lack of data on this in particular. There is so much data from other large natural disasters or man made disasters such as this one of increase in risk of PTSD after a disaster. And we don't have data on that from this incident, which is a real, real disservice to individuals who are affected by this. So that's what we know or don't know about how this has played out in the almost 40 years since this incident.

Erin Welsh

Yeah.

Erin Allmann Updyke

And when it comes to remediation, as you mentioned Erin, it essentially has not happened at all. It's estimated that the cost even decades ago would have been in the tens if not hundreds of millions of dollars and neither Dow Chemical nor the US government nor the Indian governments had any interest in paying it. Despite the fact that studies since then have consistently shown significant amounts of contamination of soil and groundwater sources around the plant of a number of incredibly problematic chemicals and heavy metals. One quote from a 2005 paper that I thought was really important when we think about this incident in the context of where it happened in the globe, I will quote: "Had compensation in Bhopal been paid at the same rate that asbestos victims were being awarded in US courts", which side note, we all know is not enough, "by defendants including Union Carbide, the liability would have been greater than the \$10 billion the company was worth and insured for in 1984."

Erin Welsh

Oh my gosh. I mean yeah.

Erin Allmann Updyke

\$10 billion. And they paid out what, 470?

Erin Welsh

\$470 million.

Erin Allmann Updyke: Yeah.

Erin Welsh: And I remember reading something about like it'll be this amount and we won't lose too much in the stocks, like it'll be fine, we'll recover.

Erin Allmann Updyke: Right.

Erin Welsh: Like it was a calculated decision.

Erin Allmann Updyke: Yeah.

Erin Welsh: Ugh, gross.

Erin Allmann Updyke: I know. Politically, survivors and current residents have continued to fight with governmental bodies in India for decades now to do more about not just the after effects but also remembering and talking about this incident. Recently there's been a push from the governmental side apparently to make some kind of memorial or museum at the site of the Union Carbide disaster. And survivors and survivor activists have really been having to fight way too hard to be a part of this process, to ensure that whatever happens reflects their lived experience rather than something just put together by someone else with some nefarious end goal of driving dark tourism or what is the end goal of just making...?

Erin Welsh: What is the why?

Erin Allmann Updyke: Yeah.

Erin Welsh: What is the message? What is the lesson?

Erin Allmann Updyke: Especially without remediation that still hasn't happened.

Erin Welsh: Right. Like build a museum on the site that still has dangerous chemical contamination.

Erin Allmann Updyke: Right. Yes.

Erin Welsh: How does like... Okay.

Erin Allmann Updyke: Yeah. It doesn't make any sense. I will post a couple of papers that were very interesting in looking more at the current political landscape surrounding Bhopal because of this. So that is what we are renaming the Union Carbide incident of 1984.

Erin Welsh: You have to specify because Union Carbide-

Erin Allmann Updyke: Yes. The 1984 Union Carbide methyl isocyanate leak that killed thousands.

Erin Welsh: Tens of thousands. And continues to affect lives.

Erin Allmann Updyke: Yeah.

Erin Welsh: Yep. It's truly shocking that we didn't know about this in any detail really before doing this episode. We've kind of talked about there are many reasons why and I think the quote that you included pretty strongly alludes to one of those reasons.

Erin Allmann Updyke: Yeah, I think if this had been an incident that happened at the West Virginia plant, everyone would know about it.

Erin Welsh: Everyone.

Erin Allmann Updyke: And we've talked about corporate negligence that has happened in wealthier parts of the world. But I don't think that there is any way that it could have been as ignored and Union Carbide could have gotten off as scot free as they did. And that is unacceptable.

Erin Welsh: Despicable. Yeah. I mean and it's because it was this calculated decision.

Erin Allmann Updyke: Right.

Erin Welsh: The people who were most affected in Bhopal tended to be the people who were of the lowest socioeconomic status.

Erin Allmann Updyke: Right.

Erin Welsh: And they also had the least amount of power to fight this giant corporation.

Erin Allmann Updyke: Right.

Erin Welsh: And I think Union Carbide used that to their advantage.

Erin Allmann Updyke: Yeah.

Erin Welsh: When the 1984 Union Carbide gas explosion poisoning happened, it made headline news around the world as it rightly should have done. But maybe because Union Carbide suppressed information, maybe because it happened quote unquote "over there", maybe because it happened to people who were poor, it didn't stay headline news or make it into textbooks the way that it should have done. And maybe that's my personal bias, being born after this happened and not having heard about it except for like a couple of years ago.

Erin Allmann Updyke: Right. I mean I think reading through the papers that I read through, it's not just us, like it does seem to have fallen out of the collective consciousness in a way that is unacceptable.

Erin Welsh: Absolutely.

Erin Allmann Updyke: Yeah. So if you'd like to learn a lot more about this, we've got sources for you.

Erin Welsh: We do. I want to shout out one in particular and that is the book 'Five Past Midnight in Bhopal: The Epic Story of the World's Deadliest Industrial Disaster' and that's by Dominique Lapierre and Javier Moro. And I have a few papers that talk more specifically about methyl isocyanate or about Sevin. But I also wanted to shout out a book that I'm actually right in the middle of, I haven't finished it yet. And it's a fiction book called 'Animal's People' by Indra Sinha. And this is based on this 1984 disaster and it's a great book so far.

Erin Allmann Updyke

I have a number of sources, many of which disappointingly are very old because it was hard to find new recent sources.

Erin Welsh

Yeah.

Erin Allmann Updyke

But a few really good ones that I used included one from 2005 called 'The Bhopal Disaster of 1984' in the Bulletin of Science, Technology & Society. And also a slightly newer one from 2009 called 'Bhopal Gas Tragedy: Review on clinical and experimental findings after 25 years'. There are a bunch of other ones both older from the late 80s, early 90s and some updated ones as well. You can find the list of the sources from this episode and every single one of our episodes on our website [thispodcastwillkillyou.com](http://thispodcastwillkillyou.com) under the EPISODES tab.

Erin Welsh

Thank you to Bloodmobile for providing the music for this episode and all of our episodes.

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Erin Welsh

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Erin Allmann Updyke

And thank you to you, listeners. We hope that you enjoyed this episode. Did you already know this? Was this brand new to you? Please let us know.

Erin Welsh

And a special thank you as always to our incredible, generous, lovely patrons. We love you, appreciate you so much.

Erin Allmann Updyke

So much, so much.

Erin Welsh

Well until next time, wash your hands.

Erin Allmann Updyke

You filthy animals.