

Allen, Pam, NMENV

From: Maestas, Ricardo, NMENV
Sent: Wednesday, June 25, 2014 3:14 PM
To: Allen, Pam, NMENV
Subject: FW: WIPP Information for today's call

Email and att. for March

From: Winchester, Jim, NMENV
Sent: Friday, March 07, 2014 10:58 AM
To: Kliphuis, Trais, NMENV; Flynn, Ryan, NMENV; Kendall, Jeff, NMENV
Cc: Tongate, Butch, NMENV; Blaine, Tom, NMENV; Schwender, Erika, NMENV; Skibitski, Thomas, NMENV; Kieling, John, NMENV; LucasKamat, Susan, NMENV; Maestas, Ricardo, NMENV; Holmes, Steve, NMENV
Subject: RE: WIPP Information for today's call

<http://www.forbes.com/sites/jamesconca/2014/03/05/wipp-is-still-the-best-and-only-choice-for-nuclear-waste/>

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From: Kliphuis, Trais, NMENV
Sent: Thursday, March 06, 2014 12:56 PM
To: Flynn, Ryan, NMENV; Kendall, Jeff, NMENV
Cc: Winchester, Jim, NMENV; Tongate, Butch, NMENV; Blaine, Tom, NMENV; Schwender, Erika, NMENV; Skibitski, Thomas, NMENV; Kieling, John, NMENV; LucasKamat, Susan, NMENV; Maestas, Ricardo, NMENV; Holmes, Steve, NMENV
Subject: FW: WIPP Information for today's call

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From: Oba Vincent [<mailto:oba.vincent@cbfo.doe.gov>]
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Subject: WIPP Information for today's call

Attached are the tables and graph with the station A, Station B, environmental sampling results (includes primary results from the second round of off-site air sampling) and the bioassay table.

To date, the following equipment will be placed on the conveyance for data collection at the AIS/Salt Station for Phase I (Unmanned Entry):

Radiological:

1. F&J air sampler – Portable, battery powered, low volume air sampler currently used by DOE RAP teams. It will be turned on, placed on conveyance, run for specified time period (~65 minutes), then removed from conveyance and the collection media (filter paper) will be counted. Pending the presence of any activity, we could then check it for energy peak with iSolo, etc.
2. SabreAlert - A lightweight battery-powered monitor that can be used as a portable work place monitor or a portable CAM for emergency response assessments. Peak fitting software subtracts radon background for more accurate workplace measurements. The CAM contains a multi-channel analyzer with 256 channels for spectral displays, built-in solid state ion implanted silicon detector, sampling pump, and a re-chargeable Lithium-Ion battery in one package. The battery is good for 6 hours when fully charged. The Cam alarm set points are 8 DAC/hr for alert and 40 DAC/hr for alarm. It needs to be in place for an hour to have the sensitivity to see down to .3 DAC.

Air Quality:

1. Industrial Scientific MX-6 Ibrid – Multi-gas detector used currently by Mine Rescue Teams to check air quality. A total of 2 units will be used to detect a total of five (5) gases (each unit is not set to detect the exact same gases). Likewise, the current configuration does not include capability for VOCs – the monitoring needed to do this has been ordered, but not on site yet.
 - a. Detector #1
 1. low oxygen
 2. carbon monoxide
 3. methane (low levels)
 4. methane (up to 100%)
 5. nitrogen dioxide
 - b. Detector #2
 1. Low oxygen
 2. carbon monoxide
 3. methane (up to 100%)
 4. hydrogen sulfide
 5. sulfur dioxide
2. PID - RAE Systems MiniRAE 3000 photoionization instrument. This instrument detects organic vapors (such as solvents) in air. This instrument will detect ionizable organics at levels less than 1 part per million.

Other:

Other: Camera – Video recording capability (e.g. Go-pro)

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WIPP Is Still The Best and Only Choice For Nuclear Waste

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The only operating underground deep geologic nuclear waste repository had its first minor accident on Valentine’s Day. It was a small release of radiation that will not harm anyone or have any environmental consequence. Maybe it was the Earth’s way of saying, “Happy Valentine’s Day. I love you, but take me for granted and I’ll slap you upside the head.”

The amount of radiation released into the environment was a million times less than any EPA action levels, but to hear the outcry you’d think it was Chernobyl. On the other hand, the general public has become aware for the first time in 15 years that the United States has a successful permanent deep geologic repository for nuclear waste, the Waste Isolation Pilot Plant, known as WIPP. Maybe this will get serious dialogue going on what to do with our nuclear waste.

<<Post-post note – As of May 4, 2014, the most likely culprit for the WIPP event was a waste stream from LANL that wasn’t treated correctly. Evaporator bottoms with KNO₃ or NaNO₃ may have been neutralized with an organic (wheat-based) absorber (kitty litter), the workers were probably trying to be green. Unfortunately, it is the inorganic zeolitic and silica properties of traditional litter that have been used for decades to hold constituents like ammonia, urea and other species for disposal, and the wheat does not do that.

We can't be sure until there is more visual evidence (the best candidate drum is about 10 rows back of the waste face), and more camera evidence must be acquired, but the event seems to have originated from a spot that was where that waste stream was placed. But having something wrong in a drum doesn't mean the rock leaked, it means someone made an operational error when the drum was packaged, nothing to do with the repository. It was a good thing it was underground instead of in a building where people were working. When WIPP is filled and sealed, even this problem wouldn't matter. There would be no pathway out. The panel should be sealed off so any further drum reactions won't escape. I'll keep updating as we understand more>>

WIPP is presently licensed only for nuclear bomb waste (transuranic or TRU) but was designed to hold any and all nuclear waste. WIPP is located a half-mile below the Earth in the massive Permian-age salts of the Salado Formation within the Delaware Basin that cuts across southeastern New Mexico into west Texas.

The Salado has geological, physical, chemical, redox, thermal, and creep-closure properties that make it ideal for long-term waste disposal — long-term in this case being greater than 200 million years. Because it is the best place, and the best rock, to put nuclear waste, or anything you want isolated from the environment forever and ever, debate has been going on to expand its present mission to include high-level waste. This event doesn't change that.

WIPP has disposed of about 80,000 cubic meters of nuclear waste, some quite hot, and has been operating for 15 years without incident. Until Valentine's Day, when there was a minor radiological release sufficient to be seen in air monitors at the surface. The signature of Pu and Am makes it certain to be from the transuranic nuclear bomb waste.

We won't know for certain until we get back in (a process that will takes weeks to months because we want to be really, really careful) but the only event we can think of to produce even this small amount is a large rock fall from the ceiling (or back) of Panel 7 that crushed one or more drums and caused a puff of material that was picked up by the 425,000 cubic feet-per-minute



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ventilation system and whisked down the exhaust system.

Immediately, the Continuous Air Monitors (or CAMs) alarmed, and the ventilation switched to HEPA filtration that removes about 99.97% of particulates (this type of radiation is always in particulate form so can be filtered). 99.97% is not 100%, as anyone with bad allergies knows, and that difference is what was released.



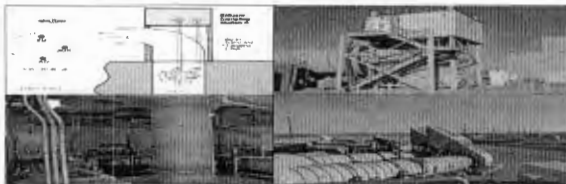
An NMSU CEMRC scientist collecting a filter sample at one of the High-Volume Air samplers, used by CEMRC to monitor the air in and around WIPP – at On-Site, Near Field and Far Field (Cactus Flats) collection stations. Samples collected before and after the Valentine's Day event indicate a rock-fall that crushed one or more waste drums, giving off a single-puff of radiation that was mostly trapped as designed, and that no health or environmental impact will occur. Source: Jim Monk, CEMRC

NMSU's Carlsbad Environmental Monitoring and Research Facility (CEMRC) independently operates a series of air, water and soil monitoring and sampling stations in and around WIPP (www.cemrc.org (<http://www.cemrc.org>)). Air filters at these sites were collected and tested as soon as they could (see Figure). The Far Field Station, 11 miles away, did not show anything but natural radiation at any time before or since the event.

Air monitors a hundred yards away from the underground air exhaust point (On-Site Station), and monitors just outside WIPP's fence line a half-mile away (Near Field Station), exhibited some radioactivity. They both had trapped several days of air flow from before the event to after the event, and showed about a Becquerel (Bq) total of radiation coming from Pu and Am. The natural background radiation collected by these filters for that amount of time is always about 40 Bq.

The On-Site filter had 0.00013 Bq/m³ total from Pu+Am and the Near Field had only 0.00006 Bq/m³ from Pu+Am. The EPA action level is 37 Bq/m³.

So these levels of Pu and Am that got out to the environment from this WIPP puff are a million times less than any environmental concern and 40 times lower than ordinary background. They pose no concern whatsoever. After removing these filters from the field to analyze them, new filters were put in, and these are being analyzed and replaced regularly, as has occurred for the past 16 years. A week after the event, the radiation at these stations had decreased by a hundred times, and soon will not even be detectable, demonstrating no long-term environmental effects.



Station A, operated by NMSU CEMRC, to monitor air exiting the WIPP underground. Upper right: photo of the 14-foot diameter air exhaust shaft as it emerges from the underground and turns horizontal. The Station A building sits over the turn and continuously subsamples the exhaust air. Upper left: schematic of sampling set-up showing the three probes that subsample the exhaust air. Lower left: photo of Station A interior. Lower right: Photo of two of the four huge blowers that drive the exhaust, each one capable of over 100,000 cubic feet per minute air flow. The

exhaust shaft is seen disappearing into the filter building where Station B sits. Samples collected before and after the Valentine's Day event indicate a single puff that was trapped by this specially-designed ventilation system, as expected. The other stations showed that a small amount of radiation was released, but well below any EPA action levels. Source: CEMRC

Just today, CEMRC released the results from filters right at the underground air exhaust point, both just before and just after the HEPA filters, called Station A and Station B, respectively (see figure). The analysis of these filters is designed to show just how much radiation left the underground and how well the HEPA filters worked to trap it. The amount of radiation on Station B filters, normalized to the flow of air through it (remember a hundred thousand cubic feet per minute through filtration), defines the point source of contamination, that is, what has gotten out of the system and spread through the environment. Station B, along with the On-Site and Near Field results, tell you if there will be an environmental impact.

The filter removed the morning after the event at Station A showed high levels of radioactivity, as expected, about 2,000 Bq/m³ of combined Pu and Am. Twelve hours later, the new filter showed about 150 Bq/m³ of combined Pu and Am. By the morning of February 21st, these levels had dropped to 0.7 Bq/m³.

Station B showed much lower levels, about 2.03 Bq/m³, when it was collected on February 18th. Three days later it was about 0.13 Bq/m³. Again, not dangerous, and less than the EPA action levels of 37 Bq/m³.

These results clearly show a pulse of material that drops off exponentially with time, and that the HEPA filters trapped most of it. The ventilation system worked exactly as designed. There never was an amount released that exceeded the EPA limits and there has not been, and never will be, an environmental impact from this event.

Of the people working at the site, thirteen received a very small dose, so small that it took a few days to determine they got any at all. An amount so small it takes days to weeks to even measure it using the most sensitive equipment on the planet. That equipment, not coincidentally, is right there in Carlsbad at CEMRC, built for just this kind of event. Since the most concentrated puff of air that got away from the exhaust point and got trapped on the nearby On-Site filter was much less than 1 Bq/m³, these people probably did not receive a dose anywhere near the EPA levels, and nowhere near any health limit. But we will find that out in a few weeks as the ultra-low analyses slowly move through the laboratory.

<<Post-post note: The follow-up biological analyses for the 13 workers with potential internal contamination showed no plutonium or americium. All environmental surface and water samples have come back as background levels. Four additional workers had trace levels of Pu in their fecal material, but nothing in their urine, again not enough for any health effects>>

Because it's so difficult and time-consuming to measure radiation this low, it has seemed that DOE has been releasing information in dribs and drabs, something that has garnered them some criticism, especially concerning the

thirteen exposed workers. At first, it seemed there was no one contaminated, then there was, etc.

But that's only because the info is being obtained in dribs and drabs. For all that the public loves speculation and has no patience for reality, it takes awhile to determine what actually happened. For the thirteen workers that had a measureable amount of contamination (many of us in this field have had this amount or more with no effects), initial measurements on the outside of the people, usually the highest amounts, didn't show anything above detection and we thought, "great, no contamination". But the contamination was so low it took days to begin measuring it internally, and will take weeks more to determine just how low it was.

Because safety is everything and we don't want any other issues to occur, we will go very, very slowly upon re-entering the underground. Since the waste will be there for millions of years, a few months won't matter. However, we know how to safely re-enter the mine right now to assess the situation. If we were allowed to make technical decisions like this without the political pressure that is surrounding this minor event, things would go faster and easier. The longer we wait, the more the people of Carlsbad will be hurt economically, the longer the waste at sites shipping to WIPP will back up, and the more the public will incorrectly think there's a major problem. There isn't.

<<Post-post note: Tom Peak with the EPA spoke last night at a town hall event in Carlsbad and stated that he has reviewed CEMRC's data as well as their own air monitoring data, and he concurs that there has been no impact to the environment or public health and that all releases observed thus far are below regulatory limits>>

A key consideration here is that we can measure radiation at any amount. You need trillions of atoms of mercury, lead or any other toxic chemical to see them at all, but we can see one atom disintegrating.

The good thing is – we can see every atom.

The bad thing is – we can see every atom.

This double-edged sword makes it difficult for the public to evaluate anything associated with nuclear and makes everyone freak out every time something happens, no matter how small. Even though the health effects of this amount of radiation is less than many Americans received from eating potato chips on that same day (a bag of potato chips has 3,500 picoCuries of radiation from K-40), we will assume the worse and move carefully from there.

However, we did design for this. The ventilation system worked as planned, since only fresh air goes over people before going over waste, and once over waste never again sees people. Once the monitoring picked up radiation, the switch to filtration was seamless. The amount of radiation received by any worker is well below the range we allow for workers at any rad facility. I wish any other industry could say the same on any day.

Of course, WIPP's 15-year perfect operational record will get lost in this one event, no matter that no one and nothing will be harmed. The cries of "shut WIPP down" or "We can't expand its mission now to include high-level waste" have already begun. Ironically, spent fuel or glass logs would have fared much better, as they're solid and would not have been aerosolized if hit with a slab of rock, and the emplacement design is so different that a slab couldn't fall because there won't be a ceiling.

This event was an operational issue about filling the repository, not a performance issue about how it will work for the next 250 million years. In fact, this event shows just how well the repository *will* work. Caving off the ceiling is what happens as the rooms collapse into themselves, followed by plastic creep which crushes all the space out as it becomes molecularly tight once again. We know this happens. We know it was going to happen. It's just never happened so quickly, before we filled the room and got out.

If you really need to get upset about risk and safety, let's review a few things that have happened in the United States in the 15-years that WIPP has been operating:

- over 3,000,000 Iatrogenic deaths from properly performed medical procedures and properly prescribed medications ([Wikipedia \(http://en.wikipedia.org/wiki/Iatrogenesis\)](http://en.wikipedia.org/wiki/Iatrogenesis))
- over 225,000 dead and \$1.5 trillion in direct health costs from using coal ([The Toll From Coal \(http://www.catf.us/resources/publications/files/The_Toll_from_Coal.pdf\)](http://www.catf.us/resources/publications/files/The_Toll_from_Coal.pdf))
- over 45,000 dead from food poisoning (CDC (<http://www.cdc.gov/foodborneburden/>))
- over 300 dead from gas pipeline explosions and hundreds more by rail tanker accidents like recently occurred in Quebec ([Pipelines \(http://fracdallas.org/docs/pipelines.html\)](http://fracdallas.org/docs/pipelines.html))
- only about 15 deaths on Wind Turbines (not bad at all! [Wind Accidents \(http://www.caithnesswindfarms.co.uk/accidents.pdf\)](http://www.caithnesswindfarms.co.uk/accidents.pdf), [EIA \(http://www.eia.gov/todayinenergy/detail.cfm?id=8870\)](http://www.eia.gov/todayinenergy/detail.cfm?id=8870))
- 80,000 cubic meters (about 500,000 55-gallon-drums-worth) of nuclear waste disposed at WIPP, one minor release of a small amount of contamination on this last Valentine's day, zero deaths, zero health effects, zero environmental contamination.

And folks want to shut WIPP down? Or think WIPP has a real problem? What Disneyland criteria do you want to apply to this repository, that doesn't get applied to *anything* else?

Americans have gotten into a bizarre habit of expecting perfection from this Universe. WIPP has worked better than anyone could have expected, better than we all expected, and this one minor event hasn't changed that in the least.

We'll see exactly what happened in a month or so, adjust the operations to prevent it from happening again, and resume operations. In the next several years, we'll negotiate how to dispose of all our nuclear waste at WIPP, and all of our nuclear waste will be isolated for millions of years and the environment will never be affected.

Or we'll freak out and the nuclear waste will stay right where it is everywhere around the country, and the environment will just have to deal with it.

It's your choice.



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Nuke Us: The Town That Wants America's Worst Atomic Waste

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There's a secure solution to America's nuclear waste problem: bury it under Carlsbad, New Mexico (<http://www.forbes.com/places/mexico/>). The locals are ready — if only Washington would get out of the way.

This story appears in the Feb. 13 issue of [Forbes Magazine](http://blogs.forbes.com/forbes/) (<http://blogs.forbes.com/forbes/>).

Bob Forrest is known for a lot of things in Carlsbad, a quiet city of 25,000 on the edge of New Mexico's empty, endless Chihuahuan Desert. He was mayor here for 16 years. He's chairman of the local bank and owns the spanking new Fairfield Inn, which sits next to the new Chili's and the new Wal-Mart. And he helped bring 200,000 tons of deadly nuclear waste to town.

That's not a bad thing—at least not here. Unlike thousands of other places in America, where the thought of trucking in barrels of radioactive garbage from atomic weapons plants would lead to marches, face paint and, invariably, pandering politicians (witness Nevada's stalled Yucca Mountain project), Carlsbad has a different take. "It's really a labor of love," says Forrest. "We've proven that nuclear waste can be disposed of in a safe, reliable way."

This attitude—“Yes in my backyard,” if you will—has brought near permanent prosperity to this isolated spot that until recently had no endemic economic engine. Unemployment sits at 3.8%, versus 6.5% statewide and 8.5% nationally. And thanks to this project—euphemistically known as the Waste Isolation Pilot Plant, or WIPP—New Mexico has received more than \$300 million in federal highway funds in the past decade, \$100 million of which has gone into the roads around Carlsbad. WIPP is the nation’s only permanent, deep geologic repository for nuclear waste. The roads have to be good for the two dozen trucks a week hauling in radioactive drums brimming with the plutonium-laden detritus of America’s nuclear weapons production.

Before WIPP the area’s economy was mostly limited to potash mining, oil and gas drilling, and a passel of tourists stopping on the way to Carlsbad Caverns, an hour south. The Department of Energy’s \$6 billion program created 1,300 permanent jobs, many of them high-paid engineering positions. Energy’s annual budget for WIPP is \$215 million, much of which stays in the community as wages. The leaders of neighboring Lea and Eddy counties have doubled down on the nuke biz, establishing a 1,000-acre atomic industrial park. Already uranium fuel maker Urenco Group has built a \$3 billion fabrication plant there, employing 300. More amenities followed, too: In November Carlsbad inaugurated the Bob Forrest Youth Sports Complex. “We are not blinded by the jobs,” says John Waters, director of the department of economic development for Eddy County. “We know what we have. We know the risks. We have a very educated public.”

But if Carlsbad’s story showcases the upside of being willing to do the nation’s dirty work, it also demonstrates how difficult it can be to get the chance to do so. Since opening in 1999, WIPP has operated so smoothly and safely that Carlsbad is lobbying the feds to expand the project to take the nuclear mother lode: 160,000 more tons of the worst high-level nuclear waste in the country—things like the half-melted reactor core of Three Mile Island and old nuclear fuel rods—that are residing at aging nuke plants a short drive from wherever you’re sitting right now.

Yet thanks to politics even more radioactive than the material itself, it hasn’t happened yet and might not happen anytime soon. Though taxpayers have

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already spent some \$12 billion mining out and engineering Yucca Mountain, 90 miles from Las Vegas, power brokers in Nevada fought the congressionally approved project from the get-go. Bowing to Nimby—and Nevada’s powerful Senator Harry Reid—two years ago President Barack Obama’s Administration declared Yucca DOA. Contractors have since laid off some 1,000 workers there.

To seek some common ground Obama then set up the Blue Ribbon Commission on America’s Nuclear Future. The BRC, as it’s known, is tasked with looking at all the options. It likes WIPP—a lot. According to its draft report last summer the BRC will insist that a “consent-based approach” be applied to any future site selection. WIPP, it wrote, is a model of how that can be done.

Cue the politics. New Mexico, in agreeing to WIPP, required that Congress enshrine in law a promise that the feds would not send high-level waste into the state. WIPP won’t be the next Yucca unless that issue is wrangled, and reversed, by Albuquerque, Washington or anyone else with skin in the game. If they pay any attention, that is. “I’m absolutely incredulous that so few opinion makers even know that WIPP exists,” says former New Mexico Senator Pete Domenici, who sits on the BRC and is a friend of Forrest.

Still, science appears to be on the boosters’ side. Carlsbad has a



Yucca Mountain seemed a remote enough place; except to Nevadans. Image via Wikipedia

Goldilocks geology that is the best solution yet found for entombing nuclear waste safely. Yucca Mountain’s volcanic tuff is prone to cracks and faults from seismic activity, which might, over thousands of years, let water seep in. Salt, on the other hand, is nearly impervious to seismic activity, quickly healing any cracks or faults and remaining completely impermeable—with no way for any water to get in or for any radiation to escape. Carlsbad sits atop the biggest salt deposit in America, stretching from New Mexico clear to Kansas. It was deposited 250 million years ago in the Permian period, when the seas receded from the shore of the ancient continent Pangea. The salt has lain undisturbed ever since.

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In the 1970s the Department of Energy floated the idea of mining out a nuclear repository in the salt under centrally located Lyons, Kans. The people didn't want it; Three Mile Island didn't help. Carlsbad made more sense; its 3,000-foot salt layer is the thickest in the country. And the state has a nuclear history as home to the Manhattan Project. The Los Alamos and Sandia national labs continue to do a lot of nuclear work. What's more, the people of Carlsbad know salt; they've been mining it since 1930 to go after seams of potash—a mineral in high demand as fertilizer.

Carlsbad's current mayor, Dale Janway, worked for 30 years as a safety director at the Intrepid mine, which he describes as an underground city with a claustrophobic warren of tunnels and rooms. All told, Carlsbad's potash mines hold more than 1,000 miles of tunnels covering 100 square miles. Compared with going after potash, says Janway, digging a spacious mine to hold drums of waste is easy. The miners were all for it.

Forrest and other Carlsbad leaders saw what billions in federal



(http://blogs-images.forbes.com/christopherhelman/files/2012/01/0124_vimby-carlsbad-new-mexico-wipp-wipp-2_650x455.jpg)

Mining the salt. Bolts are inserted into the ceiling to prevent the salt from caving in. Photo courtesy Dept. of Energy.

investment could do for their town—and their businesses. Forrest moved to Carlsbad in the 1940s; his father started a chain of tire shops, Forrest Tires. Today, in addition to the Fairfield Inn, his family owns the aging Best Western hotel nearby and controls Carlsbad National Bank, of which he's chairman of the board. Having grown up selling tires, says Forrest, "I've been a salesman all my life, and WIPP is something I've sold." He rejects the idea that he's the face of WIPP. "We don't really have a face; our whole group supports it so heavily." Dinner with Mayor Janway and dozens of other pro-WIPP Carlsbadians on steak night at the Elks Lodge backs him up.

Still, it wasn't easy to sell WIPP to the rest of the state. Folks in Albuquerque and Santa Fe didn't see why they should allow trucks to traverse their roads

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with other states' waste. When Forrest in 1990 took busloads of Carlsbadians to Albuquerque for hearings on the plan, protesters threw rocks at the bus. A common sign at the time in the windows of Santa Fe and Taos art galleries: "Another business against WIPP."

To win them over, the Energy Department brought its custom-built waste-hauling canisters to Albuquerque for punishing tests. Dropped from 30 feet onto concrete slabs, smashed into steel spikes, broiled for 30 minutes in a jet-fuel inferno—nothing fazed them. New Mexico's then Representative Bill Richardson (later governor) dragged his feet on WIPP; Senator Domenici pushed for it in Washington. At last Energy agreed, and Congress decreed that no high-level waste would be brought to WIPP. No big deal: Congress had already ordered that stuff sent to Yucca.



Each of the travel canisters on this truck can hold 10 tons of nuclear waste. Drivers have carried waste more than 12 million miles, with no release of radiation. Photo credit: Chip Simons.

Forrest says Carlsbad and DOE have contended continuously with 15 different oversight groups throughout the construction and operation of WIPP. "We were in a fishbowl. They were consulted on anything that happened at WIPP," says Forrest. "I don't have a problem with it, but you couldn't run a business like that."

On Mar. 26, 1999 the townsfolk of Carlsbad gathered to cheer the first truck to deliver waste to WIPP. Then, as now, it passed through barbed-wire gates and armed guards to deposit its load in one of a series of giant hangar buildings, the most secure of which has concrete-reinforced walls 4.5 feet thick. Inside, past the airlocks, I was half-expecting workers in moon suits, but it's just jeans and steel toes. The drums they handle—filled with scraps of machinery, rags, sludge and clothing contaminated with plutonium— have been packed at the Energy Department's labs in Idaho and South Carolina. You can stand next to most drums without concern. Others are so hot they can only be handled by heavily shielded machines.

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The drums' final resting place is down an elevator 2,150 feet into the salt. It's dark, dusty, dry. Unlike Carlsbad Caverns, there are no stalactites or stalagmites and no dripping water. WIPP's tunnels and rooms have 15-foot ceilings, enough to stack drums three high. So far it's swallowed 10,200 shipments totaling 200,000 tons impregnated with 5 tons of plutonium. To get that stuff to WIPP drivers have logged 12 million miles with loaded trucks and 10 million miles empty. Drivers work in pairs when hauling full loads and can't get hired if they've ever had a traffic violation. There have been three accidents in 13 years. In the worst, a driver jackknifed with an empty load. The waste container performed as designed, detached from the truck and rolled to a stop. No damage.

Likewise, only a few mishaps down in the salt. In 1995 a worker broke his leg in an electric cart accident. In 2008 a forklift operator gouged an inch-long gash in a drum. No radiation escaped the thick plastic bag inside. None has escaped WIPP, either. All the air that circulates out of the WIPP buildings passes through HEPA filters. Carlsbad's monitoring center picked up heightened levels of radioactive iodine in the air weeks after [Japan](http://www.forbes.com/places/japan/) (<http://www.forbes.com/places/japan/>)'s Fukushima disaster but hasn't yet sniffed any leakage from WIPP.

(http://blogs-images.forbes.com/christopherhelman/files/2012/01/0124_yimby-carlsbad-new-mexico-wipp-wipp-3_650x4551.jpg) WIPP's salt tomb is a simple, passive solution to a tough problem. Contrast that with Yucca, which requires active engineering to work. Though the mountain's volcanic tuff is three times stronger than concrete, it features lots of cracks and faults that could allow water to slowly trickle through. Over thousands of years those trickles could pick up radiation and carry it into groundwater. To cope, Energy Department engineers designed a drip shield that would deflect the water. To resist thousands of years of corrosion, however, the shield would have to be made from titanium—so much titanium that it could be irresistible to future scavengers. One person who has worked on both Yucca and WIPP says the titanium solution would negate a primary objective of a repository: ensuring that people leave it alone. "If it's 1,000 years from now and the U.S. doesn't exist, and I don't know what that titanium is protecting, I'm gonna go get it." In contrast, even if future generations wanted to dig down a half-mile, there's nothing at WIPP worth poking around for.

What's more, building out Yucca to hold 100,000 tons of high-level waste would cost on the order of \$80 billion, figures Jim Conca, a consultant with RJ Lee Group who previously worked as director of repository science for the

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Energy Department. Entombing the same waste in a WIPP 2.0 would cost less than \$30 billion. The feds have already collected nearly that much from nuclear reactor owners for the Nuclear Waste Fund. “Only in salt is the annual revenue from the fund sufficient to accomplish this program without additional taxes or rate hikes,” says Conca.

(http://blogs-images.forbes.com/christopherhelman/files/2012/01/0124_yimby-carlsbad-new-mexico-wipp-4_650x455.jpg) Even if the money's there, and the will, there's still a lingering question of how the salt would react when in contact with canisters of high-level waste, 600 degrees hot. New Mexico Governor Susana Martinez has said she tentatively supports expanding the mission of WIPP but only on the condition that “science must be the decision maker.” What could go wrong?



Trapped within the salt are microscopic pockets of 250-million-year-old seawater. Because heat increases the solubility of salt in water, the more heat, the more salt dissolved. One theory suggests that high heat will attract nearby water toward the waste canisters, potentially corroding them. Ned Elkins, Los Alamos lab's chief salt repository scientist, who works at WIPP, says all current modeling indicates that neither the heat nor water should pose any significant problems, “but we have to let the science speak for itself, to erase all doubt.” The DOE has begun a \$40 million study to prove it out, but conclusive results will take at least three years. “I sure hope it doesn't take that long,” says Senator Domenici. “So close and yet so far.”

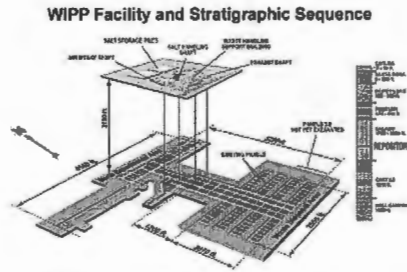
Good thing Forrest and crew have plenty to work on while they wait. They've already attracted Urenco and its fuel plant to their nuclear industrial park. Now they're seeking to build a surface-level facility to store used nuclear fuel rods in 100-ton, 15-foot-tall steel-and-concrete casks. Many reactors already use these “dry casks” to free up room in their cooling ponds. They're impervious to attack; crashing a plane into one would be as effective as throwing an egg at a fire hydrant. If the counties manage to guide that project through regulatory hurdles, their next dream is to attract a reprocessing plant, which would take the 95% of energy still left in old rods and turn it into new ones. France (<http://www.forbes.com/places/france/>) and Japan do this, but the practice is banned in the U.S. because it yields tiny volumes of ultrabad waste that could be devastating in the wrong hands.

Congressman Steve Pearce (R-N.M.) remains more circumspect, reflecting the doublespeak that Nimby coerces: “I'm supportive, but everything said today might have to be unsaid tomorrow. There's the politics of the nation, politics of state, politics of local, and all have to align.”

Pearce says he's focused on making sure there's enough funding for WIPP to do its original job. The Energy Department's budget for the project has fallen in recent years from \$250 million to \$215 million; last year WIPP contractors

shed 130 workers; those who remain are handling fewer shipments and less waste than before.

Does this make any sense? “Once it’s here and down that hole, the storage costs at other facilities go down



A schematic of WIPP. Image via Wikipedia

dramatically,” says a Department of Energy official, pointing to the 21 nuclear facilities across the country that have been cleaned up entirely after their waste was shipped to WIPP. There are nine sites left. “They should save money for the nation by sending us stuff as quickly as possible.”

Forrest finds the whole thing ridiculous. “It’s the obvious choice. We want this to be the next Yucca Mountain; we are tired of waiting,” he says. The way he sees it, WIPP has proven itself to be an ideal resting place for the stuff, while the people of Carlsbad have proven that they’re comfortable with it. The federal government, he says, should jump at the chance to shut the book on Yucca. “We are addressing a national issue,” says Forrest. “Why is this such a hard sell?”

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