

# The Salt Lake Tribune

## Utah grapples with toxic water from oil and gas industry

Grand County evaporation ponds avoided air quality regulation for years, documents show.

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THE SALT LAKE TRIBUNE

PUBLISHED: AUGUST 25, 2014 01:36PM

UPDATED: AUGUST 24, 2014 03:54PM

A massive stream of wastewater tainted with hydrocarbons has been flowing into Utah from oil and gas mining on Colorado's West Slope.

Evaporation ponds used to process the contaminated water in Grand County have released tons of toxic chemicals into the air since April 2008.

But the Colorado company running the 14-pond facility operated without a Utah air-quality permit for more than six years, public documents show, while providing officials faulty data that underreported its emissions and exaggerated the efficiency of its emission-control equipment.

Danish Flats Environmental Services finally secured a permit earlier this month and agreed to pay a reduced \$50,000 fine for its failure to seek one in a timely manner.

The Danish Flats experience reflects a larger threat to air quality posed by wastewater gushing out of Utah's increasingly busy oil patch. The permit issued by the state Division of Air Quality (DAQ) for Danish Flats was the agency's first associated with evaporation ponds, and it's now examining other evaporation disposal sites in Utah.

Danish Flats, located north of Cisco, at first avoided regulation by asserting its emissions were "de minimis," or too small to require a permit.

But a later, more reliable analysis indicated the company's emissions were not negligible, but were instead tens and possibly hundreds of tons a year — revealing the site was a major emission source for hazardous air pollutants and volatile organic compounds.

"They were out of compliance for many years, but they hung on debating with DAQ over how to estimate emissions. It was clear they were never a de minimis source, ever," said Chris Baird, a former member of the Grand County Council and Planning Commission who is now executive director of the Canyonlands Watershed Council.

Danish Flats operations manager Justin Spaeth declined to discuss the company without his engineering team and has not yet arranged such an interview.

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**Spreading ponds** • There are 15 pond "farms" operating in the Uinta Basin to handle the liquid waste, known in the industry as "produced water." All are smaller than Danish Flats — Utah's largest complex of such ponds — and each has claimed its emissions are too small to require a permit.

Six are on tribal land and under federal jurisdiction. Of the nine overseen by DAQ, two have recently conceded their emissions may exceed the de minimis standard and have begun the permit process, according to agency director Bryce Bird.

Oil and gas operators prefer disposing of their produced water by injecting it back into the earth. But that's not always possible, and millions of barrels wind up in evaporation ponds after equipment separates out hydrocarbon condensates — a light, valuable fuel.

The Utah Division of Oil, Gas and Mining, or DOGM, regulates the handling of this waste. But DAQ is now monitoring the air-quality



Courtesy Skip Ambrose Migratory birds rest on an evaporation pond operated near Cisco by Danish Flats Environmental Services, which processes wastewater from oil and gas wells. Hydrocarbons on these ponds not only pollutes the air, but can harm these birds, which are protected under federal law.

impacts. Its permit for Danish Flats gives the company another 18 months to install a flare and related equipment to capture and burn pollutants — deemed the “best available” technology for controlling emissions.

Bird said DAQ believes the \$50,000 fine is sufficient to secure compliance with state requirements in the future.

“This is a new area of regulation; we are just working through the rest of the companies in the state,” Bird said. “Until we asked questions and started pressing the issue with Danish Flats, maybe they didn’t know” the full extent of their emissions.

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Got antifreeze? •The largest single hazardous air pollutant emitted by Danish Flats came as a surprise.

Instead of the usual petroleum-based suspects, it turned out to be methanol, a chemical industry uses as antifreeze and a fracking agent.

Categorized as both a hazardous pollutant and a volatile organic compound, methanol is a form of alcohol. Unlike condensates, it is highly soluble in water, so it isn’t separated out by processing.

Documents indicate that some of the company’s estimates of its emissions were based on readings from summa canisters, perforated devices that contain activated carbon that absorbs volatile compounds.

The canisters were placed on posts on berms separating the ponds. But the devices provide reliable measurements only in enclosed settings, according to Lee Shenton, Grand County’s field inspector.

“Using them on an outdoor evaporative facility was not the most accurate way to sample. The actual emissions from that facility aren’t that low,” he said. But, he added, they are not consistently as high as the “worst-case scenario” estimated by the company.

In updated filings, Danish Flats said the most methanol it emitted in one year would have been 55 to 177 tons, based on the content of the waste it received.

Measuring the precise emissions from a field of evaporation ponds the size of Salt Lake City’s Liberty Park isn’t feasible. But since little methanol can be removed by processing, most of the methanol dissolved in the wastewater arriving at the plant is ultimately released into the air.

So calculating the amount of methanol in the water allows more accurate assessments of how much Danish Flats emits of this single hazardous pollutant — which alone exceeds the de minimis standard.

Methanol may be toxic and volatile, but it evaporates slowly and microbes quickly break it down, so ambient levels of the gas are low outside the facility’s fence, according to Shenton.

“I’m not suggesting that the methanol has no impact,” he stressed. “When these microbes consume methanol, the end product is carbon dioxide and water. The removal of the hydrocarbon makes it cleaner, but it doesn’t make the facility innocuous.”

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Mystery mist •Danish Flats began accepting wastewater in 2008 with a 1.3-acre settling pond and eight five-acre evaporation ponds, each lined with thick plastic sheets and about eight feet deep. It leased the 145-acre site from landowner San Arroyo Livestock LLC.

The produced water is first pumped into separation tanks, where valuable hydrocarbon condensates, such as butane and propane, are recovered. Then the liquid is moved to concrete vaults for a second phase of separation.

The system was designed to then direct the water to a settling pond, where more hydrocarbons would be suctioned off.

However, one regulator noted in April 2010 that a waxy block had formed on the settling pond’s surface, and he doubted any hydrocarbons could be skimmed off.

Efforts to clean the tarry substances out of the pond failed, so the firm is using one of its evaporation cells as the settling pond, according to Shenton.

A system of pipes connects the ponds, and the water is moved between them as it evaporates.

In 2010, Danish Flats finished adding six deeper ponds, which reach a depth of 18 feet. It said in filings with the county that the expansion gave it the capacity to handle up to 2.7 million barrels a year at natural evaporation rates — pegged at 57 inches for that area, the company reported to DAQ.

But, in 2009, the company handled nearly twice that much water, about 5.2 million barrels, according to DOGM data.

It used misting equipment that year to speed evaporation, which led to a citation for violating DOGM rules.

Castle Valley resident Pam Hackley saw the misting in September 2009, after she toured the site as a representative of a special services district.

She didn't see anything alarming during the tour, she said, and she left, driving north toward the Book Cliffs to check out a part of the county she rarely visits. An hour later, on her way back south, she noticed a plume coming off a Danish Flats pond and blowing over the surrounding land.

"I took pictures and drove through it and realized it was not water vapor. It was creating a gagging response," said Hackley, who later served on the Planning Commission that drafted the county's first produced-water ordinance.

She reported the incident to county officials. DOGM shut down the misting operation and cited Danish Flats for allowing wastewater to escape the ponds.

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Unreliable data • After the citation, DAQ and Grand County began pressing the company for data about its emissions and control equipment.

But officials were not satisfied with the information Danish Flats provided, and one DAQ supervisor questioned whether the firm was cooperating. The agency set deadlines for the company to comply with requests for information.

The company's first notice of intent to seek a permit, filed in July 2010, lacked basic data, such as the volume of wastewater it handled and how much condensate it recovered from the water.

In addition, regulators questioned the company's data about its emission-control technology.

The equipment, dubbed "The Trilogy," was designed for use at wellheads to collect hazardous air pollutants and volatile organic compounds and combust them.

Regulators later determined that the equipment was too small to handle Danish Flats' massive vapor stream and was unproven in a pond setting.

The company's then-CEO, Jim Bradish, acknowledged to regulators that test results provided by its engineering consultant, Weaver Boos, were unreliable. It hired another consultant to help complete the permit application.

The Cisco ponds are the first of three wastewater evaporative facilities operated by WestWater Energy. It has since developed two more in Wyoming.

Danish Flats had planned to expand its Utah operations to 20 evaporation ponds, but it appears to have stopped at 14. The last pond built remains empty because the county will not issue Danish Flats a permit to operate it until the company complies with the new produced-water ordinance and pays a new 10-cents-a-barrel monitoring fee, Shenton said.

The company's business has plunged since it expanded by six ponds. Last year it handled a million barrels, about a fifth of the water it processed four years earlier, according to DOGM data.

The drop may be due in part to other facilities that have opened closer to the Colorado gas fields, including an injection well and a purification plant at Harley Dome, just inside Utah's border on Interstate 70.

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