# *WHY ARE WE SO SICK?*

M. Gibson, PhD

Residents in Columbia and Clatsop County suffer from disproportionately high rates of cancer compared to other counties in the state. Columbia County has a population of only 1.2%, yet ranks number one in uterus, lung, and melanoma cancer and number two in pancreas cancer and female leukemia. Clatsop County has a population of only 0.97% and ranks number one in leukemia and female non-Hodgkin lymphoma and number two in uterus, brain, and female colon and rectum cancer (Figure 1).

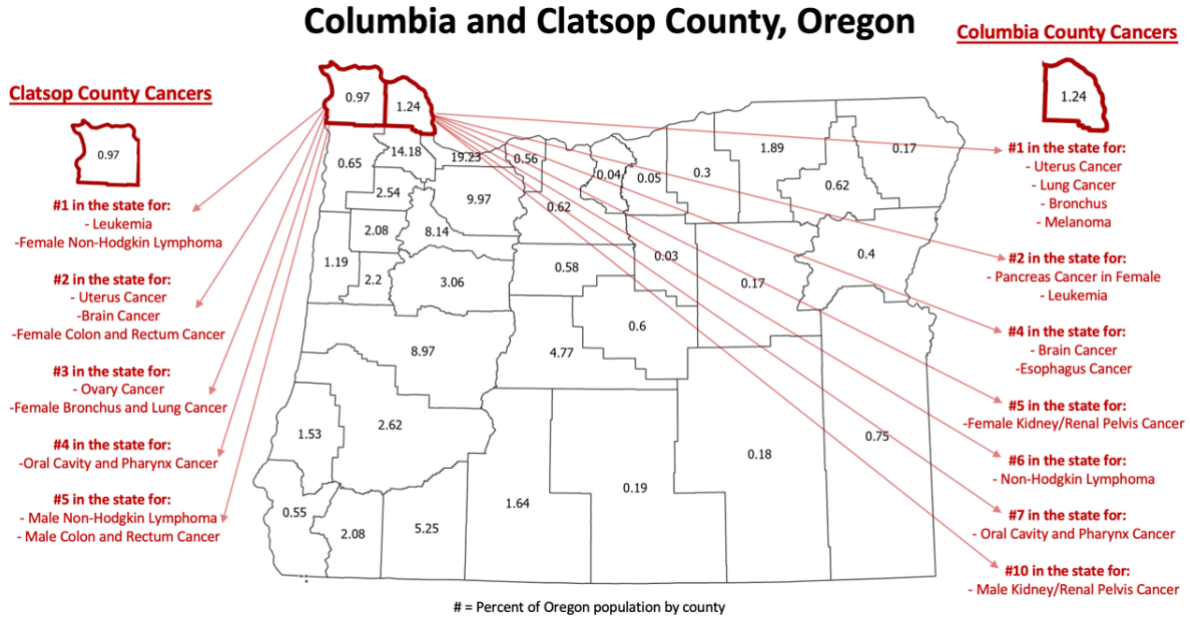



Figure 1. Oregon cancer ranking within Columbia and Clatsop County. The number within each county represents the percent of total Oregon population.

A recent study of multiple myeloma, released in 2023, shows Columbia County has significant incidences of multiple myeloma (Figure 2). Multiple myeloma is a rare, non-curable cancer that accounts for around 10% of all blood cancers. Between California, Oregon, and Washington, 133 counties delineate the West Coast, yet only 12 counties maintain significantly high rates of myeloma cancer, with Columbia County listed as one of the three in Oregon (Figure 2).

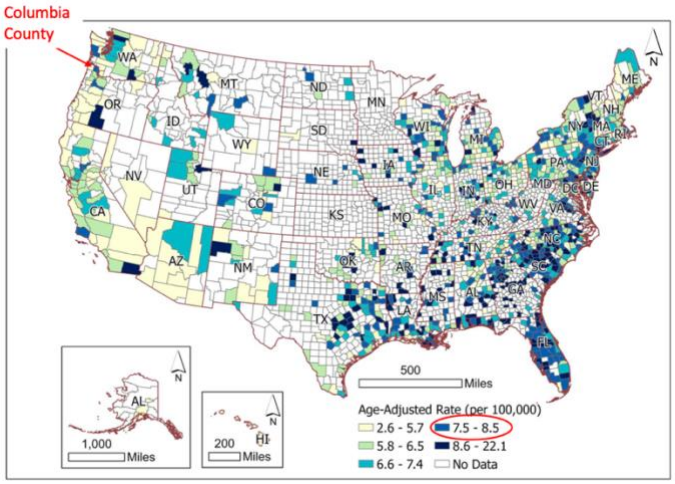


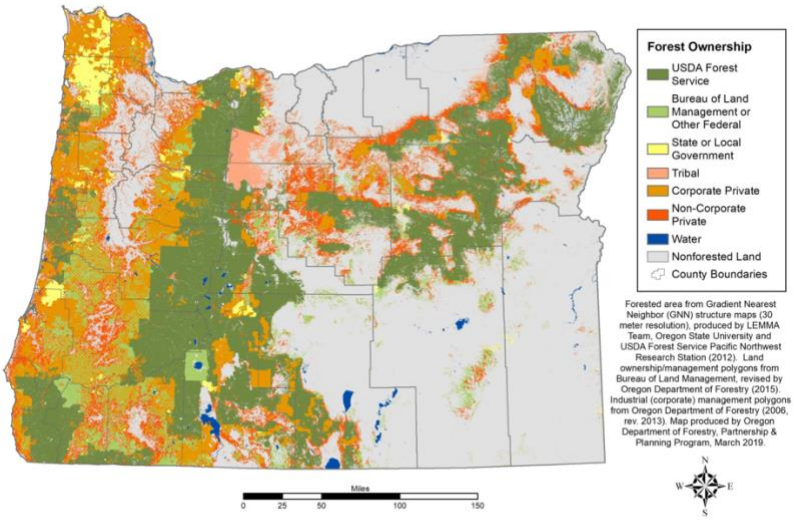

Figure 2. A study by Cheung et al. (2023) shows the average county-level age-adjusted rates of multiple myeloma incidence from 2013 to 2017. Age-adjusted rates is a statistical measurement that allows groups of people to be compared without age altering results.

In Oregon, 47% of the land is forested.[1] Timber companies spray herbicides each year with the goal to kill weeds, shrubs, and trees that compete with timber trees. The herbicides used to prevent growth is also

[1]https://odfmasstimber.com/who-owns-the-forest/

known to contaminate drinking water and cause health problems. Although, the timber companies argue most health problems are caused by spraying drift and are fairly harmless[2], evidence suggests exposure to toxic herbicides can lead to certain cancers and other health problems.

According to the USDA Natural Resources Conservation Service, Columbia County is approximately 77% forested[3], while Clatsop County is approximately 98% forested[4]. Spraying herbicides could potentially be the cause of high cancer rates in Columbia and Clatsop County, since both are dominated by forest growth for timber production. However, timber production is not limited to these two counties. A total of 47% of land in Oregon is forested (Figure 3). Tillamook and Washington Counties, with a combined population of 14.83% of Oregon's population, are home to the largest forested area in the state, but according to the [5]National Cancer Institute, cancer rates are stable in Tillamook and falling in Washington County, suggesting that forestry practices are not the root cause of cancer in Columbia and Clatsop County. In addition, the American Forests claims that trees cool air through evapotranspiration and capture particulate matter, which can improve public health greatly by catching dust, ash, pollen, and smoke on their leaves, keeping it out of human lungs.[6]




Source: Oregon Department of Forestry, March 2019.

Figure 3. Oregon forestry map

Another source of potential contamination is the Mist Gas Field, which is located in Columbia County, near the border of Clatsop County. According to Oregon.gov the storage area is approximately 5,472 acres and has a permitted daily natural gas throughput of 635 million standard cubic feet[7]. As per the US Energy Information Administration, the Mist Gas Field is the only natural gas field in the Pacific Northwest and is used primarily for

[2]https://www.hcn.org/issues/46-19/timberland-herbicide-spraying-sickens-a-community/
[3] https://www.nrcs.usda.gov/conservation-basics/conservation-by-state/oregon/columbia-county
[4] https://www.nrcs.usda.gov/conservation-basics/conservation-by-state/oregon/clatsop-county#:~:text=Established%20in%201844%2C%20Clatsop%20County,public%20(state%2Ffederal).
[5]https://statecancerprofiles.cancer.gov/incidencerates/index.php?stateFIPS=41&areatype=county&cancer=001&race=00&sex=0&age=001&type=incd&sortVariableName=rate&sortOrder=default&output=0#results
[6]https://www.americanforests.org/article/the-important-relationship-between-forests-and-air/
[7] https://www.oregon.gov/energy/facilities-safety/facilities/Pages/MST.aspx

natural gas storage, which includes several underground natural gas storage reservoirs with a combined capacity of 36 billion cubic feet.[8]

The Mist Gas Field was developed to recover natural gas; however, since its depletion, the field is used as a natural gas storage reservoir. Fracking was not needed to recover natural gas prior due to the porous sandstones, which released gas without the need to frack. However, the natural gas now stored in the reservoir is imported. Natural gas supplies enter Oregon by way of interstate pipelines, primarily from western Canada through Washington. According to Canada's Upstream Oil and Gas Industry, much of the undeveloped natural gas in Western Canada requires fracking to produce.[9] Although fracking has not been part of the Mist Gas Field operations, the injection of natural gas stored at the field likely comes from fracked reservoirs.

## Mist Gas Field Operations

Two companies operate the Mist Gas Field. Northwest Natural Resources (NW Natural) and Enerfin Resources (Enerfin) lease the land from Columbia County. Enerfin operates gas production wells, including a waste injection well, and sells the natural gas to NW Natural. NW Natural also uses the Mist facility for underground storage, while both share in the operation of the local compression station.

According to Enerfin's website, they were founded in 1986 and are a privately held natural gas and crude oil midstream "field services" business. Enerfin, through its affiliated midstream operating entities, is an owner and operator of natural gas midstream assets, including wellhead gathering pipelines, compression, treating, processing and dehydration facilities.[10] Data based on konaequilty.com states that Enerfin's annual revenue is $26,560,000.

NW Natural serves nearly 700,000 customers in northwest Oregon (16.5% of Oregon's population). In an article published by the Oregon Public Broadcast in March of 2024, they stated that *"Nearly three in five Oregon households also use natural gas as their primary heating source, according to the U.S. Energy Information Administration*." [11]

According to NW Natural Holdings February 23, 2024, Fourth Quarter and Full Year Results[12], they reported a net income of $93.9 million, which increased from $86.6 million in 2022, while filing an "*Oregon general rate case for NW Natural requesting a $154.9 million revenue requirement increase to support system investments and cost increases."* In November 2022 and April of 2023, customers saw a total increase of 25% that was approved by the state, equaling $62.7 million.[13] The state denied an original request of $82 million due to NW Natural's "*attempt to increase profit margins, give bonuses to executives, lobby public officials, and increase advertising dollars."* The increase in advertising included the creation of a children's activity book that sought to define natural gas as clean energy, which some felt was a scheme to propagandize children.[14]

## Illegal Disposal at Unlined Pit in Floodplain

On January 21, 2015 Enerfin received conditional approval by the County to drill a natural gas well in the primary forest zone, and although the county approved the application with 18 conditions, concerns were raised regarding

[8] https://www.eia.gov/state/print.php?sid=OR
[9] https://www.capp.ca/natural-gas/drilling-and-fracturing/
[10] https://www.enerfin.com/about-us
[11] https://www.opb.org/article/2024/01/14/nw-natural-lifts-request-for-customers-to-reduce-gas-use/
[12] https://ir.nwnaturalholdings.com/news/news-details/2024/NW-Natural-Holdings-Reports-Fourth-Quarter-and-Full-Year-2023-Results/default.aspx
[13] https://www.statesmanjournal.com/story/news/2022/10/27/rates-nw-natural-gas-customers-nov-1-and-again-spring-2023-rise-increase/69594728007/
[14] https://earthjustice.org/article/how-we-stopped-a-gas-utilitys-scheme-to-propagandize-children

drilling chemicals and wastewater leaking into the nearby pond or the environment.[15] Enerfin's land manager, Peggy Morgan and land use attorney, Tommy Brooks, testified at a public comment hearing that "*We recognize the environmental and cultural complexities of the this area and we're very aware of what we need to do to protect those assets...*"[11] Morgan also said while there are no poisonous or hazardous substances used in the process, Enerfin will use cement surface casing to seal off the hole and protect aquifers in the area. Tommy Brooks added that the well is for temporary use and it would be "*highly regulated by DOGAMI.*" (The Oregon Department of Geology and Mineral Industry)

By June 30, 2015, less than 6 months later, Samuel Semerjian, the landowner adjacent to the approved well, observed a non-lined, illegally dug hole in the floodplain, which was a clear violation of Enerfin's permit.

Enerfin was aware of these conditions, as stated by Peggy Morgan of Enerfin to Glen Higgins of Columbia County in a communication dated September 24, 2014, "*The mud pit will be lined to control any water or fluids used or produced during drilling. The mud pit will be cleaned according to the specifications of the Oregon Department of Environmental Quality. Our operations will have no effect on any streams or wetlands or their riparian zones within the proximity of the drill site."*

Figure 4. An attachment sent by Samuel Semerjian to DEQ, Columbia County, and DOGAMI on June 30, 2015 that shows the dumping of waste in an unlined pit, which is a violation of the Enerfin permit approved by the County. Samuel is the landowner adjacent to the temporary waste storage site.

According to Sam, the unlined hole described in an email on June 30, 2015, stated the hole exceeded 20' deep and was used as a waste dump for well drilling sludge from other well sites (Figure 4). He filed a complaint with Bob Huston of DOGAMI, informing him of the potential violation. On July 1, 2015, Sam observed Enerfin cover up the illegal unlined pit and sent pictures to Columbia County, DEQ, and DOGAMI, stating that the pit is in the floodplain and next to the creek and pond. According to a follow-up email correspondence sent from Sam to Glenn Higgins, the Columbia County Planning Manager, and Bill Mason of the Oregon Department of Environmental Quality (DEQ), he notified them that he learned DOGAMI *"has no part in enforcing violations."*, which was in direct contrast with what Tommy Brooks of Enerfin stated at the public hearing on January 21, 2015.

To seemingly defuse the situation, a letter dated July 24, 2015, written by Glen Higgins of Columbia County titled "Interested parties - regarding LUC 16-03 (Land Use Compatibility Statement for the Project), states "the seven additives to the drilling mud, as presented as attachments by Enerfin are determined to be mainly benign in liquid form and should not pose a health risk or harmful to the environment." However, Enerfin's attached document for the drilling mud additive CF Desco II Deflocculant stated under the Ecologic Information Section for ferrous sulfate that *"An environmental hazard cannot be excluded in the event of unprofessional handling or disposal. Harmful to aquatic life with long-lasting effects*." The Disposal Consideration section of the document also stated, "This material [pertaining to the product as shipped], if it must be discarded, *may meet the criteria of a hazardous waste as defined by the USEPA...The product should not be allowed to enter drains, water courses or the soil. Do not*

[15] https://www.thechiefnews.com/news/proposed-gas-well-receives-mixed-response/article_cc9d2c58-a832-11e4-b5ca-d783ea2b0803.html

*contaminate ponds, waterways or ditches with chemical or used container. Send to a licensed waste management company."*

**July 31, 2015:** Heather Kuoppamaki from DEQ sent an email to Steve Garnett, at Enerfin, (cc. Glen Higgins at Columbia County and others) stating a warning letter of Enerfin's ***"illegal solid waste activities"*** at the site will arrive by certified mail.

**August 27th, 2015:** Peggy Morgan, of Enerfin, replied to Heather Kuoppamaki of DEQ via email, which described a recent phone conversation between the two where Peggy thanked Heather for the opportunity to respond and requested a 30-day extension so that "Enerfin can fully evaluate all options for the disposal of the drilling mud cuttings."

**August 28, 2015:** Heather Kuoppamaki of DEQ agreed to the Enerfin extension for providing a proper disposal method for the drill cuttings.

**October 16, 2015:** Peggy Morgan of Enerfin sent Heather Kuoppamaki of DEQ an email stating Enerfin's official notification of the completion of the cleanup operation, with Glen Higgins from Columbia County on site prior to the commencement of operations.

**May 12, 2016:** Glen Higgins of Columbia County provided Peggy Morgan of Enerfin with a Final Inspection Memo and included a picture of a non-compliant evergreen screening hedge that needed attention. In this correspondence, Glen stated, "*Everything else in the Tambora well project has been done to perfection*. *Thank you for your understanding and diligence."*

The email sent on May 12, 2016, from Columbia County praising Enerfin's work on the project does not mention the illegal dumping pit, which led to the DEQ warning letter. Columbia County authorized the permit and also collects significant revenue from the Mist Gas Field land leases. Enerfin was not fined or penalized for the illegal pit dug in a floodplain, and it is unlikely Enerfin would have received a warning letter had Sam not pressured the County after he reported the incident, which included pictures of illegal activity.

**Underground Injection Control Class II Well Violation - 2021**

In 2021, Enerfin committed the highest federal Class II UIC injection well violation by continuing to inject into a UIC-permitted well after notification by DEQ that the permit had expired. Enerfin asked for special treatment from the state by requesting they be allowed to renew the permit rather than apply for a new one, yet the permit clearly stated that if it was not properly renewed, the permit is no longer valid, and a new permit must be obtained. Allowing the permit to expire while continuing to inject constitutes the illegal injection of waste into the waters of the state (ORS 468B.050(a). Although Enerfin was notified to stop injection in April of 2021, four months after the permit expired in January of 2021, illegal injection continued until September. The following are select communications between DEQ and Enerfin discussing the permit.

In March of 2022, David Palais of DEQ sent Jordi Harrison of Enerfin an email stating that Enerfin has allowed the permit to expire, therefore it was not eligible for renewal and must apply for a new permit. In this email, David states, "***Enerfin may not inject any fluids until the new permit has been issued***." A few months later, David Palais told Enerfin that they had not received a renewal application for the permit and said *"...as I indicated in my correspondence to you earlier in the year, Enerfin allowed the permit to expire and therefore it was not eligible for renewal but rather Enerfin was required to apply for a new permit to which you provided acknowledgment To date, DEQ has not receive an application nor fees for a new permit. Enerfin may not inject any fluids until the new permit has been issued."*

In September, five months after Enerfin had been notified to stop injections, Dave Huggins located in California sent DEQ a message informing them that Enerfin had *been using the well safely for more than thirty years, and have*

*always complied with the regulations followed by,"* ***Very little effort is needed on DEQ's part, because of the long history."*** to which David Palais replied, "*The requirements written into the expired permit...clearly state that the option to renew the permit ended on the permit expiration date of January 31, 2021...****The rule is clear that the Director will not grant permit renewal beyond the permit expiration date."***

A month later, Peggy Morgan of Enerfin sent DEQ a letter asking DEQ to consider a compromise on the renewal vs application for a new permit and asked DEQ to consider a variety of factors including that the cost of the new permit was onerous, and ***Enerfin believed the permit expired in November of 2021.***

In March of 2022, almost a year after Enerfin was notified the permit expired, Kevin Weberling of DEQ sent an email to Tom Imre, one of the founders of Enerfin, reminding him that Enerfin is not allowed to inject without a new permit and sent a pre-enforcement letter through certified mail to Tom that stated,

> "*Based upon monthly injection reports sent from Enerfin Resources to DEQ after the January 31st, 2021 permit expiration date, it has been determined that at least five separate discharges occurred during February, March, June, August and September 2021.* ***This is a class 1 violation.***
>
> *(1) February 1st-6th 2021, Enerfin Resources reported 183 barrels of saltwater injection.*
> *(2) March 14th-20th 2021, Enerfin Resources reported 178 barrels of saltwater injection.*
> *(3) June 20th-26th 2021, Enerfin Resources reported 254 barrels of saltwater injection.*
> *(4) August 1st-7th 2021, Enerfin Resources reported 179 barrels of saltwater injection.*
> *(5) September 12th-18th 2021, Enerfin Resources reported 250 barrels of saltwater injection.*
>
> *Class I violations are the most serious violations; Class III violations are the least serious....*
>
> *The violations cited above may have caused significant environmental harm or posed the risk of significant environmental harm and the matter is being referred to the DEQ's Office of Compliance and Enforcement for formal enforcement action. Formal enforcement action may result in assessment of civil penalties and/or a DEQ order. A formal enforcement action may include a civil penalty assessment for each day of violation. "*

Tom replied, *"I have received your notice letter (attached) and, as you may be aware,* ***Enerfin believes its permit expired in November 2021****.."*

By July 2022, in the document *"Answer to notice of Civil Penalty Assessment and Order"* written in response to the DEQ's warning letter, Enerfin requested a "*contested case hearing and informal discussions."* (Figure 5)

**CONCLUSION**

For the reasons stated above, Enerfin requests a contested case hearing on the Notice of Civil Penalty Assessment and Order, and requests informal discussions with the DEQ prior to such contested case hearing.

DATED this 29th day July 2022.

CABLE HUSTON LLP

By: _____
James S. Kincaid
OSB No. 872773

Of Attorneys for Enerfin Resources

PAGE 6 – ANSWER TO NOTICE OF CIVIL PENALTY ASSESSMENT AND ORDER; REQUEST FOR CONTESTED CASE HEARING AND INFORMAL DISCUSSION

Figure 5. A request from Enerfin to DEQ asking for an informal discussion concerning illegal activity at the Mist Gas Field.

To date, Enerfin has not obtained a new permit, and the outcome of the request for informal discussions with DEQ, including if the fine was paid, has not been made publicly available. However, both Tom Imre and Peggy Morgan of Enerfin stated that they believed the permit expired on November 8, 2021. At the top of the 14-page permit, it clearly states the expiration date of January 31, 2021 (Figure 6a). The permit was modified at the request of Enerfin in 2016 and also shows the expiration date of January 31, 2021 on the first (Figure 6b).

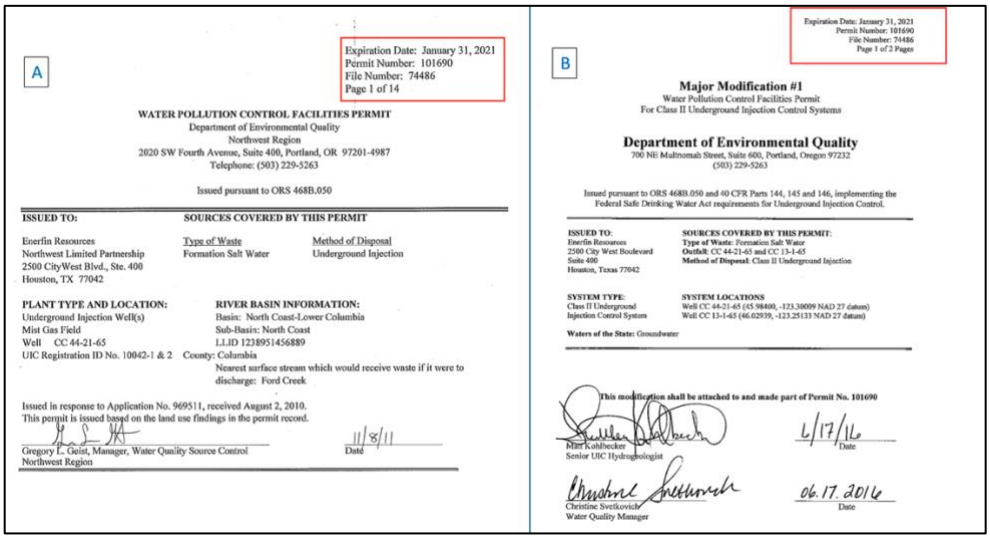
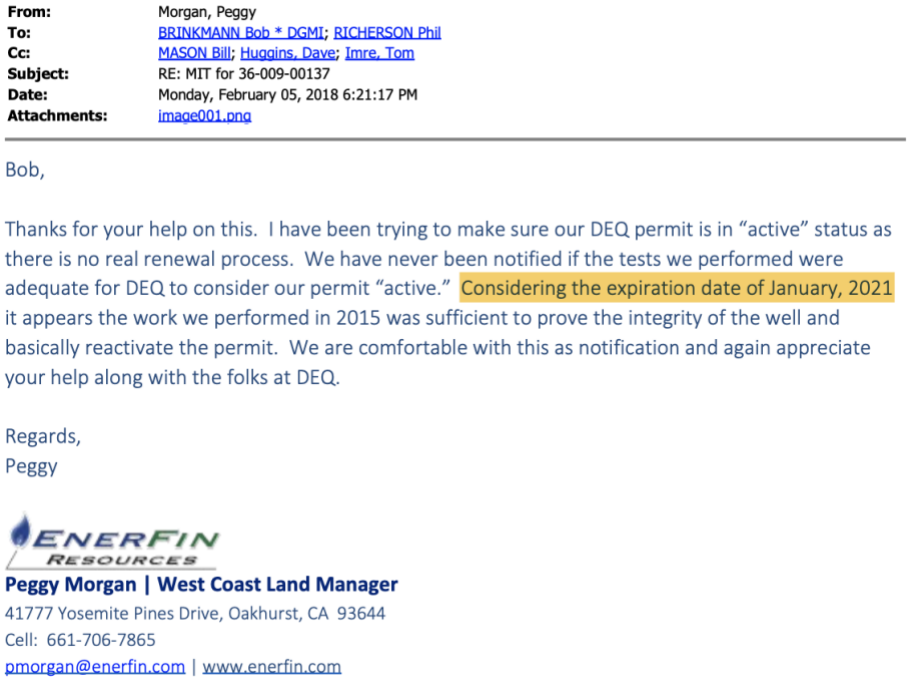



Figure 6. **A)** first page of the UIC Class II Injection Well Water Pollution Control Facilities Permit with the expiration date of January 31, 2021. **B)** the permit was later amended in 2016 and also shows the expiration date of January 31, 2021.

Furthermore, an email sent in 2018 from Peggy Morgan at Enerfin to Bob Brinkman of DOGAMI clearly states Enerfin was aware of the permit expiration date of JANUARY 2021 (Figure 7), indicating Peggy Morgan was aware of the expiration date, yet on October 13, 2021 in her email correspondence to DEQ, she stated Enerfin thought the permit expired in November of 2021.



**From:** Morgan, Peggy
**To:** BRINKMANN Bob * DGMI; RICHERSON Phil
**Cc:** MASON Bill; Huggins, Dave; Imre, Tom
**Subject:** RE: MIT for 36-009-00137
**Date:** Monday, February 05, 2018 6:21:17 PM
**Attachments:** image001.png

Bob,

Thanks for your help on this. I have been trying to make sure our DEQ permit is in "active" status as there is no real renewal process. We have never been notified if the tests we performed were adequate for DEQ to consider our permit "active." Considering the expiration date of January, 2021 it appears the work we performed in 2015 was sufficient to prove the integrity of the well and basically reactivate the permit. We are comfortable with this as notification and again appreciate your help along with the folks at DEQ.

Regards,
Peggy

ENERFIN RESOURCES
**Peggy Morgan | West Coast Land Manager**
41777 Yosemite Pines Drive, Oakhurst, CA 93644
Cell: 661-706-7865
pmorgan@enerfin.com | www.enerfin.com

Figure 7. An email sent in 2018 by Peggy Morgan, Enerfin's West Coast Land Manager, states the injection well permit expires in January 2021.

The fine Enerfin received for illegal injections totaled $28,892. According to Exhibit 1 of the Findings and Determination of Respondents Civil Penalty Pursuant to OAR 340-012-0045, the state calculated the fine based on a civil penalty formula, which included a mental state of respondent value of 10, which is the highest value due to the respondent acting flagrantly and had knowledge that the conduct was unlawful.

Although the penalty formula is calculated based on a variety of variables, the bulk of the fine is derived from the benefits gained and the cost avoided or delayed due to non-compliance and described to "level the playing field" by taking away any economic advantage the entity gained, and to deter potential violators from deciding it is cheaper to violate and pay the penalty than to pay the cost of compliance. In this case, the bulk of the fine was $14,492, which was determined by the state as the amount gained by avoiding spending $17,099 on the individual permit application fee (it is assumed the annual permit fee Enefin paid was subtracted from this cost). However, according to the United States Environmental Protection Agency's (EPA) Requirements for enforcement authority, Class II injection well civil penalties shall be recoverable for any program violation in at least the amount of 1,000 per day, with criminal fines recoverable in at least the amount of $5,000 per day "against any person who willfully violates any program requirements for Class II wells..."[16]

Although Enerfin willingly injected into a formerly permitted UIC Class II injection well, they only furnished the state with weekly estimates and were not charged by the EPA's standards, and since the violation was determined to be willful, it should have been considered a criminal referral. Although the EPA considered unauthorized injection a high priority to ensure adequate protection of underground sources of drinking water, which falls under the United States Safe Drinking Water Act, Oregon only imposed a fine for the violation, with the bulk of the fine determined by the cost of the permit fee.

[16] https://www.ecfr.gov/current/title-40/chapter-I/subchapter-D/part-145#

According to the [17]EPA's UIC website on primary enforcement responsibility (primacy), *"A state...with UIC primacy, or primary enforcement authority oversees the UIC program in that state...requires applicants to meet EPA's minimum requirements for UIC programs."*

Oregon DEQ sought and was approved for primacy by the EPA effective October 9, 1984. On December 6, 1984, DOGAMI approved the original permit for the injection well. Since Oregon maintains primacy over the program, DEQ has the authority to implement additional UIC permit requirements beyond "Federal rules." yet the Oregon.gov website for the UIC program states in bold font, "**According to Federal rules, the burden of proof is on the owner/operator of the system, not DEQ to prove that an injection activity does not have the potential to cause a violation of the primary drinking water standards, adversely impact groundwater quality, human health or the environment."** Therefore, it appears DEQ is regulating the program without imposing additional permit restrictions beyond the minimum standards of the EPA, and it appears DEQ is not enforcing penalties set by the EPA for violation of the Class II injection well permit. Since DEQ does not appear to be enforcing beyond the standards set forth by the EPA or enforce penalties established by the EPA; therefore one can assume the only benefit to a state with primacy, such as Oregon, is that it allows the state to issue injection permits quickly, although the DEQ website states, ***"The UIC program's goal is to protect freshwater aquifers from contamination due to underground injection systems..."*** [18]

Enerfin knowingly and illegally used formally permitted Class II injection well from February through September 2021. With the exception of June, all injection volumes exceeded the two previous years (Figure 8). Although records show Enerfin injected in May 2021, the DEQ did not include it in their initial pre-enforcement letter.

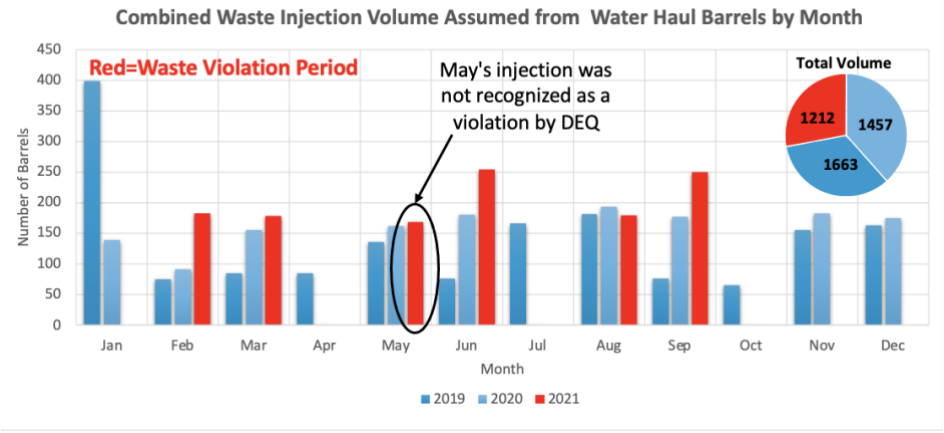



Figure 8. Well injection volumes based on water barrels in 2019, 2020, and 2021. Enerfin was notified by DEQ in April to cease all injections in 2021 yet continued to do so through September of 2021. The May injection volume was not recognized by DEQ.

### The Schatz Family

In 2017, Daniel and Nickie Schatz moved to land about 16 miles east of the Mist Gas Field. In the spring 2021, their health declined rapidly. Their two daughters, ages 2 through 5 at the time, showed symptoms of heart issues, unexplained pain, and rapid weight loss. By June, due to extreme nausea and an inability to retain nutrients, Nickie lost 10% of her body mass in 11 days and weighed under 99lbs.

[17] https://www.epa.gov/uic/primary-enforcement-authority-underground-injection-control-program-0
[18] https://www.oregon.gov/deq/wq/wqpermits/pages/uic.aspx

The family suffered from sleep deprivation. Their daughters showed blue veins streaking up their right cheeks from their jaws and across the right side of their foreheads. Daniel started to lose bodily feeling, and the family's pallor turned yellow, while he dropped weight from 156 lbs to 117 lbs.

The doctors could not determine the cause of their ailments. In the summer of 2021, the family's carbon monoxide alarm began going off. Assuming it was faulty, they purchased a free-standing carbon monoxide alarm, which also alarmed them of gas in their home. Since gas was not piped into the house, they began leaving the windows open to combat the toxins, and by the winter of 2022, they purchased a natural gas leak detector, and when they held it up to the water running out of their tap, the meter registered natural gas exposure.

The Schatz then rented gas meters to determine gases and concentrations. The meters were capable of detecting nitrogen dioxide, carbon dioxide, carbon monoxide, methane, and hydrogen sulfide. Methane was found in small, sporadic pockets, peaking at 5% LEL, which is in the lower explosive range. The Schatz ran a qualitative non-target analysis on their water, and hundreds of contaminants of concern were identified, including hydrocarbons, alcohols, acids, siloxanes, phenols, terpene, and dangerous levels of carbon monoxide and nitrogen dioxide, and unsafe levels of hydrogen sulfide, and carbon dioxide.

The Schatz maintain a groundwater right on their property, and they are required each year to hire an independent contractor to record and submit the static water level to the Oregon Water Resources Department. The static water level in the well at the time of drilling was 140 feet below the ground surface and remained at approximately that depth, except for March of 2022 when the water level was recorded at 17 feet below the ground surface. The change in groundwater conditions does not appear to be explained by precipitation alone since the highest average precipitation during the winter season leading up to each static water level measurement in March occurred during 2021.

Due to the odd well measurements in 2021 and contaminants in their water, the Schatz filed a formal complaint with DOGAMI regarding the Mist Gas Field and discussed their concerns with Bob Brinkmann of DOGAMI. Bob spearheaded the complaint and asked NW Natural to conduct an internal review. After the conclusion of their internal review, NW Natural determined they were not at fault. The Schatz then took their complaint to the Oregon Department of Energy (ODOE) and the EPA.

**Site Visit by the Oregon Department of Energy**

On September 21, 2022, Daniel Schatz contacted the ODOE and requested a site inspection of the injection well that Enerfin illegally operated the previous year. In a letter sent to Daniel Schatz, from Wally Adams - Operations and Policy Analyst of ODOE, he describes a site visit and conversation he had with Dave Huggins of Enerfin where Mr. Higgins said, "...they did not explicitly keep records of what was injected, rather they keep records of the water produced at the various wells, knowing that the production water will be injected at the saltwater disposal well." Dave Huggins provided Wally Adams with records dating back to 2016. In the letter, Wally describes the records as "six spreadsheets" for each year from 2016 to 2021. When asked about 2022, Dave Huggins stated, "we will prepare that spreadsheet at the end of the year..." To date, no public record of injection rates from a metered gage is available from Enerfin.

Also, during the 2022 site visit, Ron Smith of Enerfin, showed Wally Adams the injection well and described the process in which a tanker or vac truck would connect to transfer tanks through a hose, at which point the pump would activate the well head valves and allow the liquid to flow from the transfer tanks the injection well.

As part of the investigation, the ODOE attempted to ascertain if there were records to indicate the origin of wastewater that was injected at the injection well, as well as the current operating status of the well. According to the letter, Enerfin provided these records, but it appears Enerfin prepares and furnishes records of injection volumes not based on the actual injection rates but rather by proxy examination of wellfield operations, which

include water barrel hauls (Figure 9). Wally Adams of ODOE reviewed Enerfin's records and concluded no violation occurred.

Oregon Department of Environmental Quality
Attn: Dave Palais
700 NE Multnomah Street, Suite 600
Portland, Oregon 97232-4100

April 6, 2021

RE: Mist Field, Oregon
Facility ID - 74486
Permit No. –101690

1. Monthly Water Disposal – March 2021

| Well # | | Water Injection (Barrels) | Injection Pressure (psig) |
|---|---|---|---|
| 44-21-65 (API 36-009-00137) | March 01-06 | 0 | 0 |
| | March 07-13 | 0 | 0 |
| | March 14-20 | 178 | 200 |
| | March 21-27 | 0 | 0 |
| | March 28-31 | 0 | 0 |

2. Formation Pressure change (as occurs) – no change noted
3. Injected water chemical analysis (annual) – last test – 01/2019
4. Mechanical Integrity Test (at least every 5 years) – last test - 11/08/17

I certify that I am familiar with the information contained in this report and that to the best of my knowledge such information is true, complete and accurate. If you have any questions or need additional information, please call at your convenience (713) 888-8603.

Jordan Harrison
Enerfin Resources
jharrison@enerfin.com

Figure 9. The injection well record submitted to DEQ in April 2021. The report does not contain raw data. Enerfin's personnel are responsible for producing the one-page monthly summary report to DEQ.

Enerfin's ability to "prepare the spreadsheets," as quoted in the letter to Daniele Shantz by ODOE, suggests no regulatory agency is provided with raw data of injection operations; therefore, the state must rely on Enerfin's self-governing abilities to furnish evidence of violations.

Furthermore, the state does not require chemical testing for constituents within the transfer tanks and so the state cannot prove that Enerfin's illegal or permitted injections were limited to salt water and did not contain toxic chemicals.

In the 2022 site visit of the injection well, ODOE writes that they had some difficulty locating the well and stated, "We twice retracted our path before finding the entrance. He wrote, "*The well area appeared to have not been used for some time, although it is difficult to say how long it had been since a vehicle had entered. We did not see evidence of recent vehicle traffic within the well area.*" Figure 10a, obtained from satellite imagery furnished by Oregon[19], shows the condition of the injection well site in 2022, and historical imagery shows similar site conditions dating back to 2000. However, in 2023, satellite imagery obtained by Google Earth Pro shows the injection well site appears to be actively used (Figure 10b), including vehicle tracks at the turnoff (Figure 10b1)and tracks leading to the tanks(Figure 10c2, in addition to what appears to be a truck and trailer parked near the injection well (Figure 10c1).

[19]https://www.arcgis.com/home/webmap/viewer.html?url=http%3A%2F%2Fimagery.oregonexplorer.info%2Farcgis%2Frest%2Fservices%2FOSIP_2022%2FOSIP_2022_WM%2FImageServer&source=sd

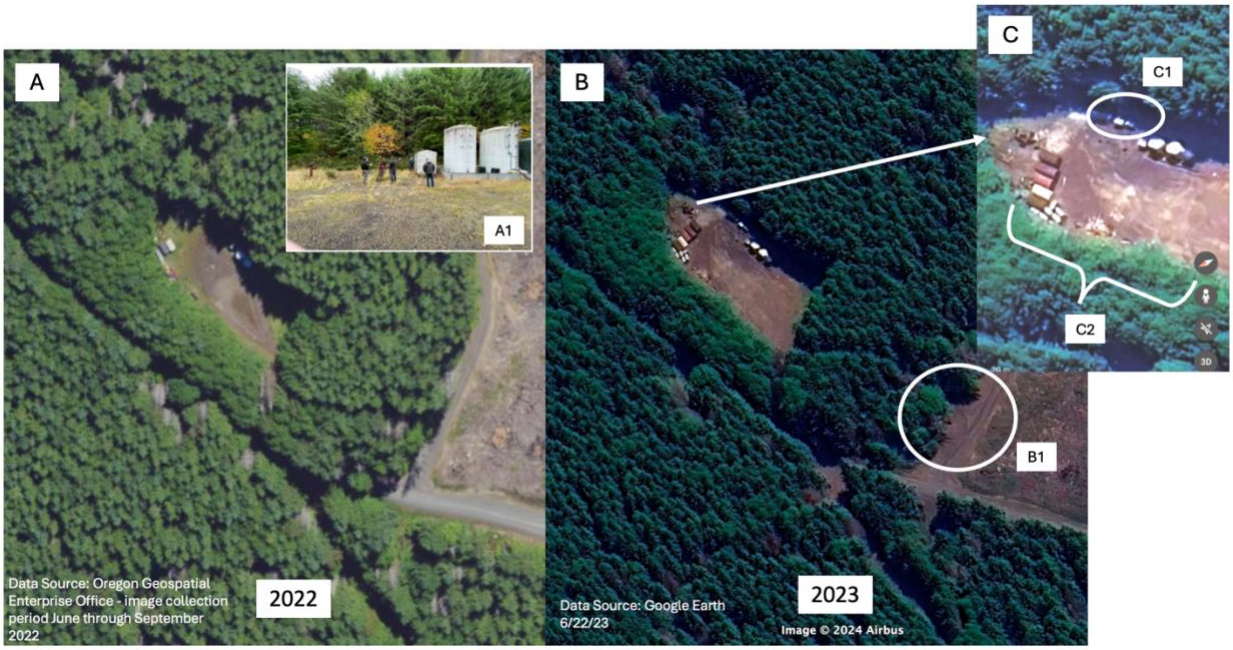



Figure 10. **A)** The UIC Class II injection well site imagery, taken by satellite in 2022, and a picture (A1) taken during the 2022 site visit. **B)** Imagery of the injection well site in 2023 shows vehicle tracks indicating increased traffic at the turnoff (B1) and increased storage activity (C), including what appears to be a truck and tank (C1) and vehicle tracks near the injection well (C2).

In the letter to Daniel Shats from Wally Adam's of ODOE, he describes a conversation he had with Kevin Weberling from DEQ during the site visit, which stated, "According to Mr. Weberling, Enerfin continued injecting in February and March 2021, after which Enerfin was notified. He said that Enerfin claimed to have "sorted out" the issue in April 2021, but they continued injecting for several more months.

The DEQ never conducted an on-site visit of the injection well after they notified Enerfin to stop all injections, nor did they conduct an on-site visit when Enerfin contested DEQ's pre-enforcement letter and asked for "informal discussions" with DEQ. It appears DEQ's only enforcement of illegal injection activity, knowingly committed by Enerfin, was a warning letter.

**EPA Site Assessment at the Schatz Home**

In May 2023, an EPA site assessment took place at the Schatz home. The EPA samples were sent to the wrong lab, and EPA made the decision to scrap the samples and re-do the site assessment. The second site assessment occurred on June 14, 2023, and a third-party contractor measured turbidity. The original turbidity reading when the water started flowing from the tap was 35, which then went up to 90 NUEs. The meter was disconnected for sampling, and when the contractor went to get a final reading after sampling, it read 1000 NUEs, which then went down to 90 NUE as the water from the tap ran clear. The EPA's results from the second site assessment found, 2, 4 dinitrotoluene and 2, 6 dinitrotoluene. The EPA also found other compounds of interest, including 1, 2 dichloropropane, chloroform, methylene chloride and dimethylphalate. The EPA also found actionable levels of lead, yet no action has been taken by the EPA to determine the source of the chemicals.

## Potential Contamination Pathways: Faulting and Earthquakes

The Mist Gas Field is located in an extremely geologically active area due to plate tectonics. The gas field is the only depleted natural gas storage reservoir in the Pacific Northwest. The only other natural gas storage reservoir is

located in an aquifer within the state of Washington. The natural gas storage reservoir must maintain geologic mechanics suitable for retaining the reservoir; however, due to plate tectonics, the crust is rotating throughout the area underlying the Mist Gas Field (Figure 11)

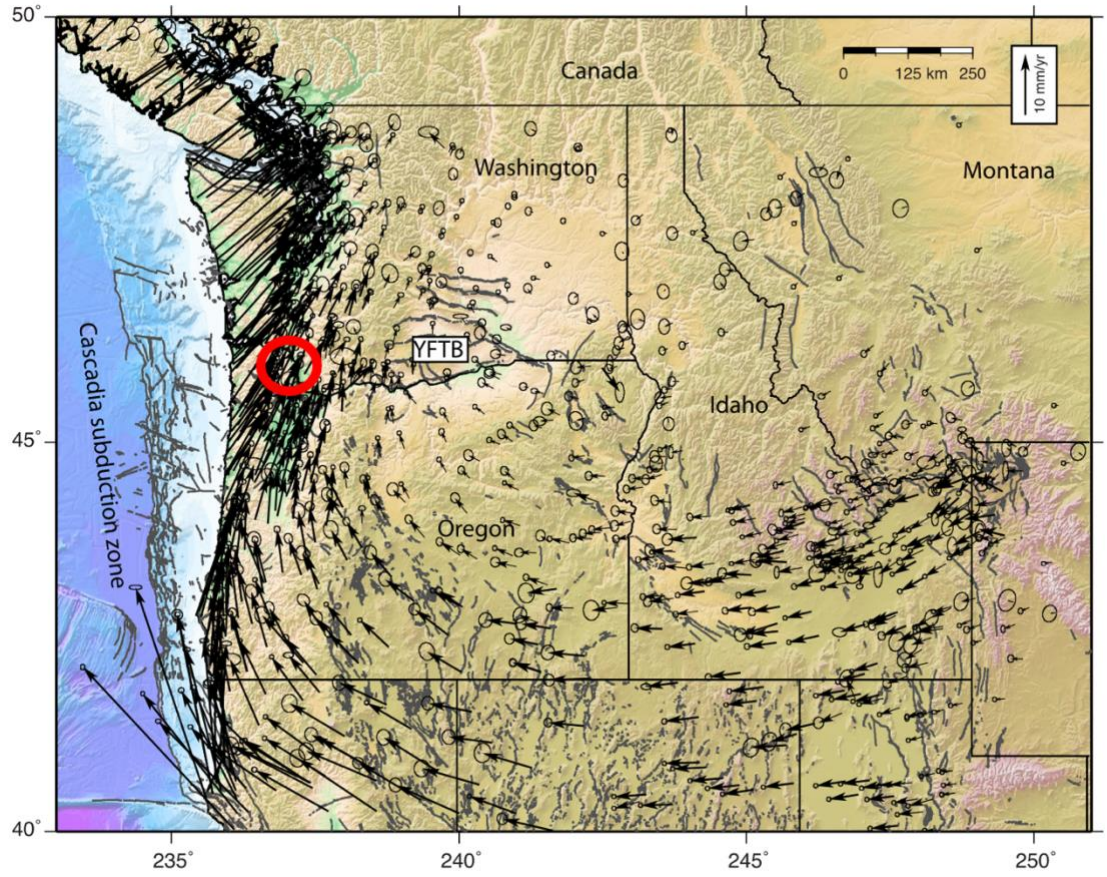



Figure 11. The red circle show the general location of the Mist Gas Field in Oregon. The arrows represent the velocity fields of the Pacific Northwest relative to North America in 2016. Image modified from McCaffrey et al.(2017).[20]

The crustal movements cause earthquakes and subsequent faulting. According to a report titled *Underground Gas Storage Regulatory Considerations: A Guide for State and Federal Regulatory Agencies*, it states, "In some cases, faults might be considered geologic horizontal barriers, but faults are often not always impermeable and may be activated as leakage pathways under sufficiently elevated stresses or reservoir pressures."[21]

Columbia County has experienced earthquake activity, as seen in Figure 12, from data provided by the USGS Search Earthquake Catalog[22]. Four earthquakes, within the Mist Gas Field occurred, two of which were recorded within a little over half of a mile from the UIC Class II injection well (Figure 12). A report to Congressional Requestors, written by the US Government Accountability Office in 2014, states that the safeguards of the Class II program do

[20] McCaffrey, R., King, R., Wells, R., Lancaster, M., Miller, M. 2016. Contemporary deformation in the Yakima fold and thrust belt with GPS. Geophysics Journal 1-11.
[21] Ground Water Protection Council and Interstate Oil and Gas Compact Commission. Underground Gas Storage Regulatory Considerations : A Guide for State and Federal Regulatory Agencies . May, 2017. 122 pages.
[22] https://earthquake.usgs.gov/earthquakes/search/

not address emerging underground injection risks such as seismic activity and overly high pressures in the geologic formations leading to surface outbreaks of fluids.[23]

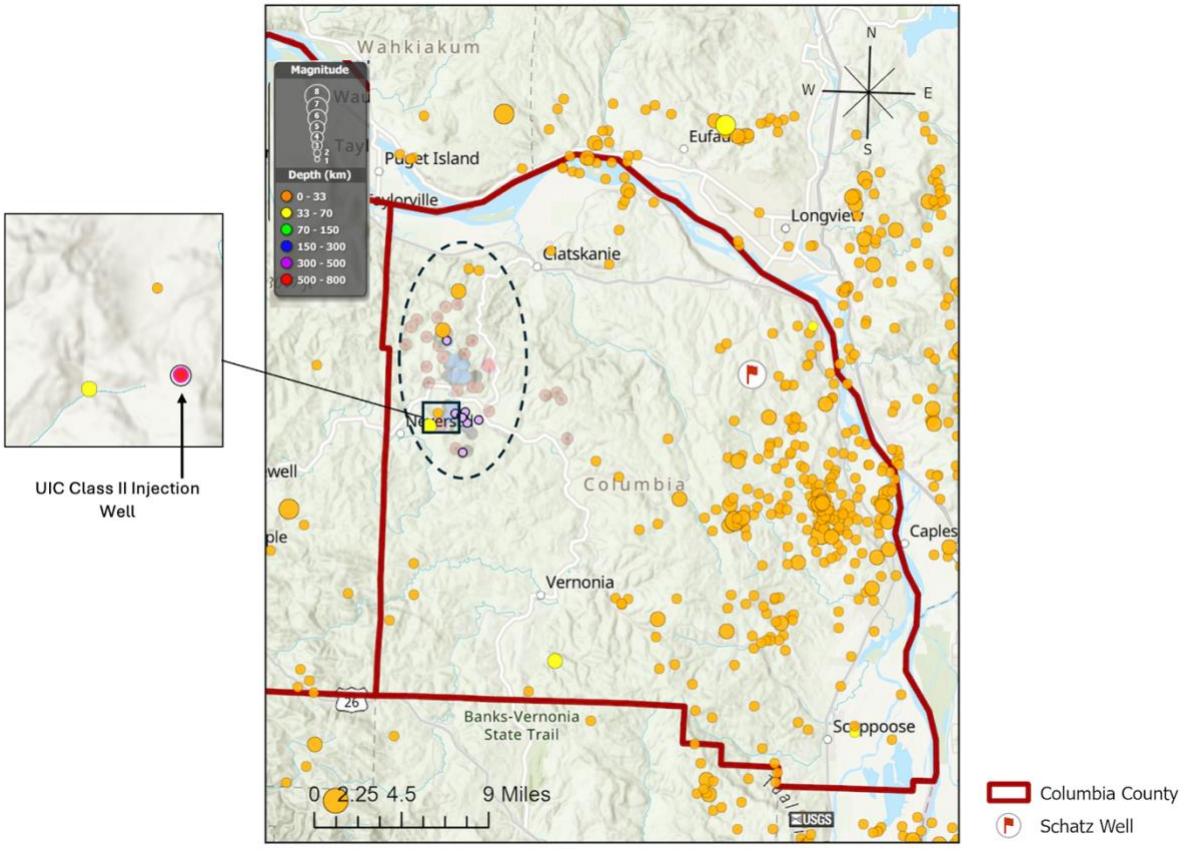



Figure 12. The USGS Earthquake record shows seismic activity within the Mist Gas Field (dotted area) and two seismic events that occurred near the injection well.

The Mist Gas Field and surrounding area are heavily faulted and chopped up. Fault data provided by DOGAMI shows faults occurring in and around the Mist Gas Field. Work conducted by the USGS[24], although limited to the central and southern end of Columbia County, shows significantly more faults, including those within the southern area of the gas field. The density of faults is likely more representative of the complex faulting throughout the Mist Gas Field (Figure 14).

[23] https://www.gao.gov/assets/gao-14-555.pdf

[24] Wells, R.E., Haugerud, R.A., Niem, A.R., Niem, W.A., Ma, L., Evarts, R.C., O'Connor, J.E., Madin, I.P., Sherrod, D.R., Beeson, M.H., Tolan, T.L., Wheeler, K.L., Hanson, W.B., and Sawlan, M.G., 2020, Geologic map of the greater Portland metropolitan area and surrounding region, Oregon and Washington: U.S. Geological Survey Scientific Investigations Map 3443, pamphlet 55 p., 2 sheets, scale 1:63,360, https://doi.org/10.3133/sim3443.

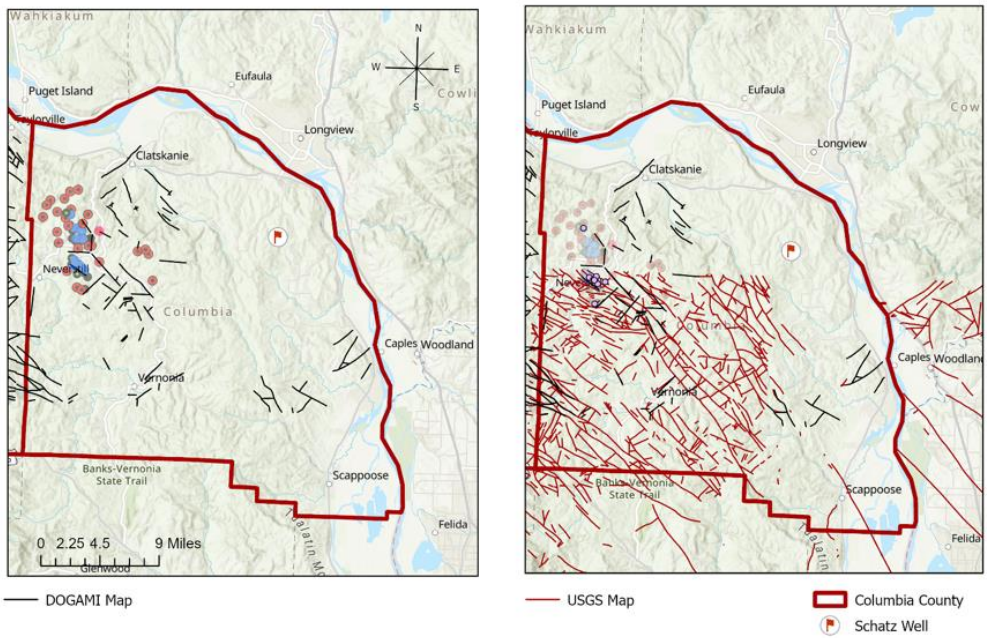



Figure 12. Left: fault data provided by DOGAMI (Source OGDC-7 geodatabase).[25] Right: fault data distributed by the USGS[26]covering part of central and southern Columbia County.

The caprock, which is the formation that traps the natural gas at the Mist Gas Field, is described as a mudstone of the Cowlitz Formation. However, a 1991 USGS paper states, "*The trapping conditions at Mist are complex and still under debate. Most of the gas pools appear to be in fault traps on a large anticlinal structure...However, at least one gas pool occurs in a shale-encased sandstone, a pure stratigraphic trap...Tuffaceous deep-water shales of the upper Cowlitz and Keasy Formations overlie the gas-producing reservoir sandstones and serve as impermeable sealing beds.*" [27]

In 2017, per Michanowicz, who surveyed more than 9,000 active natural gas wells, said he *estimated that one in five of these wells were built for gas production, not storage, and thus likely to be missing subsurface safety values and other equipment needed to store gas under high pressure*. However, that number proved too conservative, and two-thirds of these wells are being used in ways that were not intended decades ago. Furthermore, he stated, "*If there is nobody guaranteeing the safety of these wells across the U.S...tens of thousands of people don't realize that they're one corroded steel casing away from disaster*." [28]

[25] https://pubs.oregon.gov/dogami/dds/p-OGDC-7.htm
[26] Wells, R.E., Haugerud, R.A., Niem, A.R., Niem, W.A., Ma, L., Evarts, R.C., O'Connor, J.E., Madin, I.P., Sherrod, D.R., Beeson, M.H., Tolan, T.L., Wheeler, K.L., Hanson, W.B., and Sawlan, M.G., 2020, Geologic map of the greater Portland metropolitan area and surrounding region, Oregon and Washington: U.S. Geological Survey Scientific Investigations Map 3443, pamphlet 55 p., 2 sheets, scale 1:63,360, https://doi.org/10.3133/sim3443.
[27] Stanley, R., Geologic Basis for Petroleum Resource Assessment of Onshore Western Oregon and Washington. USGS Open-File Report 88-450X. 31 p.
[28] https://coeh.ph.ucla.edu/2019/07/07/the-toxic-gas-catastrophe-hiding-beneath-your-home/#:~:text=They%20didn%27t%20know%20that,the%20Colorado%20blast%20in%202017.

A 2017 document titled *Long-Term Viability of Underground Natural Gas Storage in California: An Independent Review of Scientific and Technical Information*[29] states that the age of wells and historical well construction practices dramatically increase the likelihood of loss of containment. Other issues associated with containment include well quantity and quality of cement and corrosion of casing. The report also describes the cap rock as evidence of initial integrity since it retained natural gas; however, "*the seal can sometimes become degraded over time with repeated pressure and stress cycling*...the factor with the greatest potential to affect storage capacity is formation damage." The report also describes risk due to leakage as, " *The storage gas may migrate from the reservoir geologic structure, reaching drinking water aquifers and/or the surface, which represents a potentially significant risk to human health, safety, and the environment...Likely pathways for gas migration from the gas storage reservoir are caused by failure of vertical and/or lateral containment, which can be caused by artificial (well) penetrations, naturally occurring faults or fracture systems that may be transmissive, and compromising of the confining zone/caprock sequence due to reservoir overpressurization..."* The report also states, "*In general, the loss of well integrity remains the primary factor in underground gas storage...with failure of subsurface reservoir integrity and surface operations being important secondary contributors..."* An illustration provided in the report of the mechanisms for leakage associated with underground gas storage is shown in Figure 14.

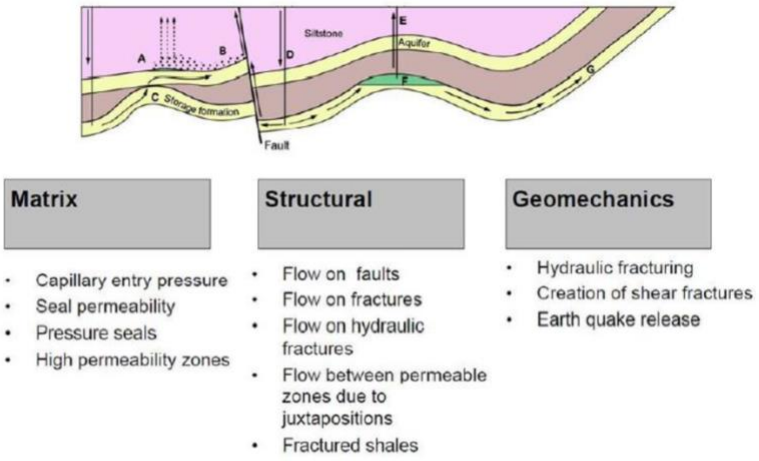



***Figure 1.3-4. Identification of the leakage factors associated with gas storage reservoirs. Potential leakage pathways and mechanisms are indicated by the letters A-G as follows: (A) Gas leaks out of the reservoir through an eroded gap (missing local seal), (B) the gas pressure accumulated in the above-zone saline reservoir exceeds the capillary entry pressure in the regional seal and leaks upwards, (C) Gas leaks upwards along a conductive normal fault, (D) Gas leaks up a poorly cemented annulus of a UGS injection well, (E) Gas leaks up a poorly plugged abandoned well, (F) regional groundwater flow transports dissolved gas out of the structural closure, and (G) once out of the closure, groundwater transports gas to surface springs and into the atmosphere. (From IPCC (2005), but see also Nygaard (2012) and Bruno (2014)).***

Figure 14. An illustration describing leakage factors in a gas storage reservoir. Source: Tomastik, T. 2017[28]

The Mist Gas Field is considered a depleted reservoir used for natural gas storage. According to a report written by the [30]National Energy Technology Laboratory in 2019, utilizing depleted reservoirs is attractive due to pre-existing

[29] Tomastik, T. 2017. Long-Term Viability of Underground Natural Gas Storage in California. An Independent Review of Scientific and Technical Information. California Council on Sciences and Technology. 20 p.
[30] https://www.osti.gov/servlets/purl/1492342

infrastructure. The report also states, ***"Depleted oil and/or gas fields may pose the risk of abandoned, or orphaned, wells penetrating the storage reservoir, which can serve as a leakage conduit to neighboring formations or the atmosphere."*** Using pre-existing infrastructure also includes repurposing production wells into natural gas storage wells.

Tommy Brooks, a land use attorney, testified for Enerfin during a public comment hearing designed as a platform for citizens to express concerns over Enerfin drilling a new injection well said, "*We've drilled up in the hills. We've drilled down in the valley. We've drilled close to [and] in proximity to streams."* Peggy Morgan, Enerfin's land use manager, stated, "*There have been over 240 wells drilled in the Mist field since 1979."* And, Glen Higgins of Columbia County said, "*The Mist area has been blessed with numerous gas wells...We have a lot of older gas wells dating back to 1979 on different lands throughout this Mist gas field area and they've been comingled with farming and forest practices for 30 years, and we really haven't seen any problems."* [31]

The number of wells drilled in the Mist Gas Field is unknown and many are aging, and some have been repurposed. The oldest wells date back to 1979, with 11 recorded wells drilled at that time. The median age of the wells drilled in the Mist Gas Field from 1979 to 2017 is 34 years old, with the oldest wells 45 years of age (Figure 14).

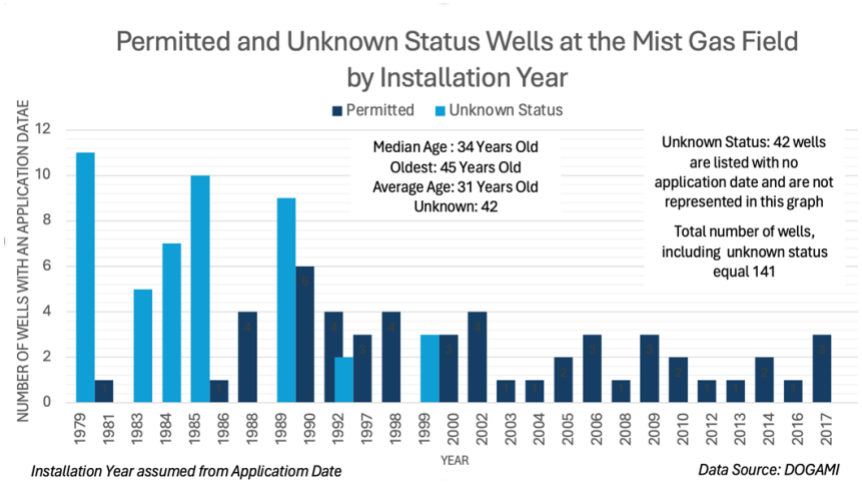



Figure 14. The number of wells by application date. The application data is the assumed construction date. Data obtained from DOGAMI.

**Senator Jeff Merkley once said, "I know from my time in the state legislature that DOGAMI is basically often an advocate for mining,"[7]**

Bob Brinkmann, the former DOGAMI employee tasked with dealing with the Schatz complaint, has since changed position to the Knife River environmental manager. In 2023, he was quoted in a new article saying, "***generally, it's on the mining operators to make sure they follow the rules. It's like you have a driver's license. You're supposed to know what the law is and not speed excessively.***" [32] The article describes federal lawmakers pushing back on the way Oregon handled complaints about groundwater contamination caused by the Knife River Corporation. The complaint included regulators balking at citizens' complaints and ignoring potential permit violations. Bob is described as a graduate with a BS in Geology from Colorado State University and is an experienced hydrogeologist in the mining industry and a private consultant. After graduation, Bob went to work for Chevron.

[31] https://www.thechiefnews.com/news/proposed-gas-well-receives-mixed-response/article_cc9d2c58-a832-11e4-b5ca-d783ea2b0803.html
[32] https://www.oobp.org/article/2023/06/13/oreogn-water-pollution-knife-river-corporation-crook-county/

Kevin Weberling' is the DEQ's UIC Senior Hydrogeologist. He is tasked with Enerfin's injection well oversite and worked with the Schatz on their complaints to DEQ. His Linkedin's page describes himself as working for the Marathon Oil Corporation from August 2005 to 2011, and Exxon Mobil for 5 years form June 2002 to August 2005, with his only skill listed as "Petroleum Geology".

Stephen Nguyen, the EPA's Region 10 Site Assessment Manager, tasked with leading the site assessment at the Schatz home, was a Chevron REACH Scholar, according to his LinkedIn page. The Chevron International REACH (Recognizing Excellence and Achievement) Scholarship Program is sponsored by Chevron for the sons and daughters of its employees and retirees. The program was established to recognize and assist outstanding children who plan to pursue post-secondary education.

In 2016, Enerfin requested an amendment to the injection well permit, which included granting NW Natural access to inject into the UIC Class II injection well. The DEQ granted the amendment, yet during the 2022 site visit, NW Natural claimed they never used the well.

In 2022, Gary Dye, a formal whistleblower of NW Natural, was an engineer hired in 2000 that came from a career in oil and gas and said, "NW Natural is a utility that the state cannot afford to go bankrupt." [33] He said he exposed NW Natural for billing more than they were supposed to and also claimed that he saw things that were completely unethical, including charging customers regular gas while providing low-value gas, which he attributed to the bankruptcy of Blue Heron Paper Mill that cost 170 people their job. Meanwhile, it appears Columbia County has not yet addressed the cause of cancers that sicken the area's men, women, and children, most of whom rely on groundwater as their primary source of drinking water (Figure 14).

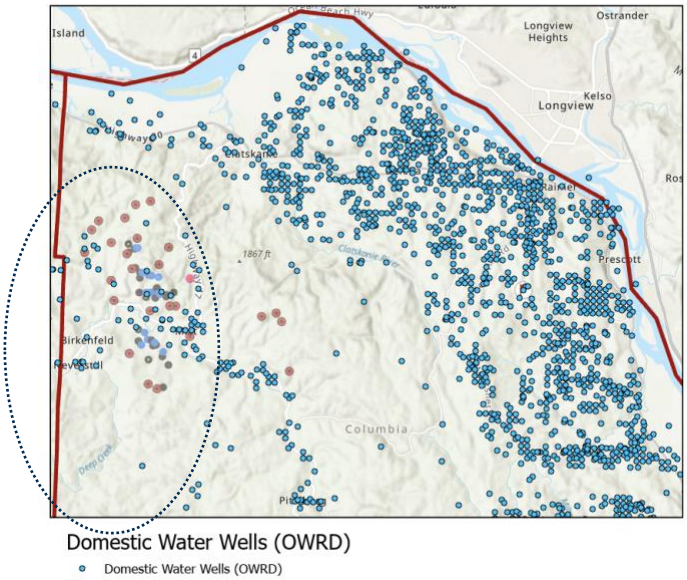



Figure 14. Domestic wells surrounding near the Mist Gas Field (dotted region).

*American Aquifers would like to thank the Schatz family for sharing their story and providing information and documentation.*

*American Aquifers is a 501c3 non-profit, located in Oregon, with the mission to protect our aquifers and to educate, support, and advocate for sustainable groundwater use through community outreach, data collection, and scientific research. AmericanAquifers.org*

[33] https://wholecommunity.news/2022/10/06/gary-dye-to-eugene-environmentalists-keep-fighting-nw-natural/