

Inergy Seeks Approval for Gas Storage in Once Deemed Unusable Salt Caverns

By **Peter Mantius**, on January 7th, 2013

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Other Major Safety and Environmental Issues Confront Inergy in the New York Finger Lakes Region



WATKINS GLEN, N.Y.—A Kansas City energy company is urging New York and federal regulators to disregard explicit warnings about the structural integrity of two salt caverns that it plans to use to store millions of barrels of highly-pressurized liquid propane and butane.

One cavern was plugged and abandoned 10 years ago after a consulting engineer from Louisiana concluded that its roof had collapsed in a minor earthquake. He deemed the rubble-filled cavity “unusable” for storage. It is now scheduled to hold 600,000 barrels of liquid butane.

The other cavern sits directly below a rock formation weakened by faults and characterized by “rock movement” and “intermittent collapse,” according to a 40-year-old academic study that cautioned that the cavern might be plagued by “difficulties in production arising from the geological environment.” That cavern is scheduled to hold 1.5 million barrels of liquid propane.



Both warnings were overstated, according to Inergy LP, which begins the fourth year of its bid to obtain an underground storage permit from the state Department of Environmental Conservation. “There is no reason to believe now that a roof cavern collapse did in fact occur,” Inergy wrote in a confidential 2010 report to the DEC.

The company claims its own tests show the caverns to be structurally sound and suitable for storing the liquefied petroleum gases, or LPG, under pressure of 1,000 pounds per square inch.

Public details of contrary opinions are scarce because Inergy, which bought the caverns from US Salt in 2008, has insisted that their history is a confidential “trade secret.”

Both the DEC and U.S. Environmental Protection Agency have generally accepted that argument and withheld or redacted many historical documents requested under state and federal Freedom of Information laws. However, the EPA did provide one document to DCBureau that disclosed the name of the Louisiana consulting engineer—Larry Sevenker. The DEC later released documents that summarized Sevenker’s 2001 analysis of “Well 58,” the entry point for the cavern now set to hold liquid butane.

Those records and recent interviews with Sevenker reveal the DEC’s concerns about Well 58 and other Seneca Lake salt caverns in

early 2001 following a series of catastrophic gas explosions in Hutchinson, Kansas.

Sevenker had made many trips to the Watkins Glen brine field to study wells and caverns for US Salt and predecessor companies before US Salt hired him to report on Well 58. Dug in 1992, the well was originally used to mine salt by extracting brine, but US Salt had plans to eventually use the cavern to store compressed natural gas.

However, Sevenker's findings convinced US Salt's local manager, Alan Parry, to plug and abandon the cavern surrounding the well, according to a once-confidential letter.

"Our intentions for this well are to plug and abandon on the advice of our consultant, Mr. Sevenker," Parry wrote the DEC on May 24, 2001. "He clearly states in his report that the roof movement is unusual and renders the cavity unusable for continued development or storage."



Larry Sevenker

Days later, Kathleen Sanford, a DEC permit administrator, wrote to New York State Electric and Gas to request a report on the integrity of nearby salt caverns NYSEG was using to store compressed natural gas. In particular, she wanted to know if its storage caverns had been affected by the Well 58 roof collapse "that occurred sometime prior to Feb. 12, 2001." She said her questions "are in response to the Hutchinson, Kansas, incident."

Sanford was referring to a Jan. 17, 2001, natural gas leak from salt caverns in the Yaggy brine field seven miles from Hutchinson, which triggered a series of fiery explosions. The gas had migrated through rock faults and accumulated at seemingly random sites. One explosion leveled two downtown businesses. A day later a gas geyser ignited near a trailer park miles away, killing two people. Hundreds of residents were evacuated and could not return home for months.

Salt caverns have a troubled safety history when used to store either compressed natural gas or LPG. A 2004 analysis by industry insider John Hopper found them to be far more prone to catastrophic accidents than other more common underground storage options.

Salt caverns represented only 7 percent of the nation's 407 underground storage sites for gas in 2002, but they were responsible for all 10 of the catastrophic accidents involving gas storage between 1972 and 2004, Hopper found.

In fact, major fires and explosions struck at salt caverns holding LPG in 1980, 1984, 1985 and 1992, killing or seriously injuring people in three of those cases. Catastrophic accidents hit salt caverns holding compressed natural gas in 2001, 2003 and 2004.

Hopper wrote his report for Hart Energy Publishing shortly after explosions rocked a natural gas storage facility at a salt cavern in a Moss Bluff, Texas, in August 2004. Gas had leaked into a pipe used to extract brine. The resulting fire burned for three days, consuming billions of cubic feet of natural gas. An evacuation order extended out three miles.

Salt caverns that rely on a single well to inject and withdraw gas or LPG (such as Moss Bluff) are particularly vulnerable to major accidents, but redundancy is expensive, according to Hopper. Inergy has planned a single injection/withdrawal well for its butane storage cavern but is building redundancy into its propane storage cavern.

The nation's most recent salt cavern storage crisis began unfolding in August 2012 when a giant sinkhole in a Louisiana brine field began swallowing earth and trees. It has been growing ever since, and tremors have been common. The sinkhole is only about 200 feet away from a plugged and abandoned salt cavern and about 1,500 feet from a salt cavern that holds nearly 1 million barrels of liquid butane. Fearing a potentially massive explosion, officials have ordered the evacuation of 150 residences in the lightly populated area.

Inergy has downplayed such storage accidents. And a firm it hired to conduct a quantitative risk analysis, or QRA, of the proposed Watkins Glen LPG project did not analyze previous catastrophes or evacuation orders. Neither did it consider accidents involving human error. The QRA determined the probability of a fatality as far away as the village of Watkins Glen (less than three miles) to be zero.

In contrast to QRA contractor, the DEC's Sanford was concerned that the Hutchinson catastrophe could be repeated in Watkins Glen. In her June 4, 2001 letter to NYSEG, she cited similarities between the Yaggy and Watkins Glen brine fields and noted that "plugged wells were reentered at both sites." Sanford now serves as the No. 2 official in the DEC's Department of Mineral Resources, which oversees permits.

Both Sanford's letter and Sevenker's analysis of Well 58 (the cavern earmarked for butane storage) had been buried under confidentiality orders until late 2012. So the specific issues they raised never came up at a DEC hearing on the project in September 2011 that drew hundreds to the Watkins Glen High School auditorium.

Even so, public opposition to Inergy's project began heating up in early 2011 after a non-profit group, Gas Free Seneca, was formed to oppose the company's gas storage plans.

Membership includes more than 120 Watkins Glen-area businesses—many of them wineries, restaurants or lodgings tied to the tourism economy of this Finger Lakes village. The group has objected to the industrialization of Seneca Lake, to a proposed 13-acre open brine pit next to the Seneca Lake Wine Trail, and to new rail and

truck traffic the project would stimulate. Inergy announced early last year that it would replace the giant brine pit with two smaller pits on sites that are less visually prominent and less of a threat to the lake.

Last August, several hundred Gas Free Seneca protestors rallied on the southern shore of Seneca Lake and then marched with bullhorns and anti-LPG posters through Watkins Glen. A month later, about a dozen protestors blocked a gate to the Inergy property on the west side of Seneca Lake three miles to the north. Three people were arrested when they refused to move. Two paid fines, and one went to jail.



Joseph Campbell

Joseph Campbell, co-founder of Gas Free Seneca, has argued that Inergy's long-time point man for the project, William Moler, repeatedly shaded the truth in his public statements. Inergy said Moler abruptly resigned, effective October 5, to "pursue other interests."

Six weeks earlier, on the day before the Aug. 17 Watkins Glen protest march, Moler had written an opinion column in the Elmira Gazette that took a swipe at Campbell's group:

"We feel compelled to share certain facts with the community and the neighboring area that this anti-gas group's organizers will almost certainly disregard or misreport: Our proposed storage facility will not store natural gas."

In fact, Inergy had been storing natural gas at its Seneca Lake brine field facility for more than a year, and it had tested adjacent caverns with an eye toward expanding that activity. Only two weeks before Moler wrote his newspaper column, he had boasted to Wall Street securities analysts that natural gas stored at Inergy's Seneca Lake site had recently been linked to the Millennium

Pipeline.

Inergy had purchased NYSEG's compressed natural gas business at the site, along with pipelines, for \$66 million in July 2011.

Inergy uses separate subsidiaries to administer the storage of liquids (Finger Lakes LPG Storage) and of gases (Arlington Gas Storage) at the facility. But the salt caverns it would use to store both natural gas and LPG are all located in a cluster within the brine field, which is dotted with dozens of wells dating back to the 1890s. One cavern that once held LPG is now a candidate to store gas.

Inergy, US Salt and predecessor companies have been extracting salt from the Watkins Glen brine field for more than a century through a process known as solution mining. After a well is drilled into a salt layer roughly 2,000 feet underground, water is injected to dissolve the salt walls. Super-salty water, known as brine, returns to the surface. The brine undergoes an evaporation process that yields high-quality salt.

Eventually, as the salt walls melt away, deep caverns are formed.



When Inergy purchased US Salt in 2008, it gained both a profitable salt business and caverns that could be used to store either natural gas or LPG.

Inergy has since sold the Watkins Glen brine field property to Inergy Midstream, a publicly-traded affiliate in which it owns a majority stake.



William Moler

Inergy and Inergy Midstream own gas pipelines and storage facilities in regions that have been actively drilling shale formations for oil and gas, using high-volume horizontal hydrofracking techniques. Their properties are clustered near the Marcellus shale in New York and Pennsylvania, the Bakken shale in North Dakota and the Eagle Ford shale in Texas.

Inergy Midstream had listed Moler as its president and chief operating officer at meetings with securities analysts last August, but the company did not specify his role in its annual report to the U.S. Securities and Exchange Commission, or SEC, for the fiscal year ended Sept. 30. Inergy announced his resignation as a senior vice president in late September. Inergy's annual report said he did not receive special compensation when he left and noted that he "forfeited all of his outstanding equity awards ... in connection with his resignation." Moler's LinkedIn profile recently listed him as executive vice president of Tallgrass Energy LP of Kansas City. Inergy and Inergy Midstream did not respond to DCBureau's questions about Moler's departure and other issues.

Inergy Midstream stores about 40 billion cubic feet (Bcf) of natural gas in upstate New York – 26 Bcf at its Stagecoach facility near Binghamton, 13.2 Bcf at two facilities 60 miles to the west, and 1.5 Bcf at its Watkins Glen facility. It has announced plans to develop a total of 5 Bcf of gas storage space in Watkins Glen.



Inergy Midstream also owns an underground storage facility in nearby Bath that holds 1.5 million barrels of LPG. The company is applying to the DEC for an underground storage permit for 2.1 million barrels of LPG in Watkins Glen.

Under ideal conditions, salt caverns can provide an excellent impermeable seal, and the cavities can work well for storing liquid or gaseous hydrocarbons under extreme pressure.

But there are risks, and Inergy is required to disclose them to potential investors in reports to the SEC. Among the many risks listed in its latest SEC annual report are the potential "collapse of storage caverns" and "leaks, migrations or losses of natural gas and (liquids)."

"We are not fully insured against all risks inherent in our business," Inergy's SEC report says. "In addition, we are not insured against all environmental accidents that might occur, some of which may result in toxic tort claims."

But the company minimizes concerns about cavern integrity in its August 2011 Environmental Impact Statement on the LPG project, saying:

"The way to determine the suitability of a cavern to store hydrocarbons is to test the cavern's pressure containment capability. Having reviewed all the evidence of the past operating data, geological and engineering studies and the results of sonars, hydrotests, vertilogs, and the successful pressure tests, (the) underground storage permit application demonstrates the suitability of these caverns to store LPG."

But that public document does not fully address the specifics of a 1973 geological study by C.H. Jacoby and L.F. Dellwig, both now deceased.

Jacoby and Dellwig focused on geological faults on the property Inergy now controls, writing: "In the Watkins Glen brine field a major north-south strike-slip fault extends down at least to a bedding (step) thrust along which the block to the west of the tear fault has moved north a minimum of 1200 feet..."

The geologists also zeroed in on Wells 33 and 34, which reached into Inergy's "Gallery 1," the same cavern the company plans to use to store 1.5 million barrels of pressurized liquid propane.

"Faulting above the cavity created by solution (salt mining) between Wells 33 and 34 may have resulted in a weakness which led to the observed periodic collapse and pressure buildup," Jacoby and Dellwig wrote. "It is over this area that the major thrust bifurcates at several points, creating a series of planes of weakness in the section overlying the solution zone."

The presence of faulting near a cavern can raise concerns about both collapse and leakage. Jacoby and Dellwig reported that brine from a well near Wells 33 and 34 had migrated along a fault line, flowing all the way to the surface a half a mile away.

Inergy analyzed the Jacoby study privately for the DEC in 2010, but the company asked the agency to keep most of it secret, and it has complied.

Last January, Inergy made public an analysis by in-house geologists Leonard Dionisio and John Istvan that stated that the company "knows where the faults are located from our geological studies, and we are aware of what might or might not happen over time."

"However, based on company experience, site data and public data, no cavern has ever failed due to geological movements within the salt."

Sevenker had a different view in 2001. He provided US Salt with a list of 30 earthquakes in 1999 and 2000 that might have caused Well 58's roof to cave in. He omitted a 3.2-magnitude quake on Feb. 3, 2001 in Bath that was nearer and stronger than most he had listed.

Both DEC and EPA officials have repeatedly raised questions about cavern integrity. For example, both agencies have expressed concern about the relatively narrow salt pillar that separates Inergy's Gallery 1 from another cavern to the north that is not considered sound. Noting that Inergy initially estimated that the pillar was only 70 feet thick before revising its estimate to 166 feet, the EPA sought evidence for the revision.

Inergy has said the pillar will hold, even after it begins expanding the cavern by exposing its salt walls to undersaturated brine, a technique used to expand storage volume.

The company has been drilling new wells (FL1, FL2) to reach into the "Gallery 1" cavern, replacing older wells that have weakened casings (34, 43, 44).

Meanwhile, Inergy has scrapped its initial plan for "Gallery 2"—the butane storage cavity. It had intended to use one of the caverns purchased from NYSEG, but it settled instead on the cavern under Well 58, despite its controversial history.



The cavern Inergy rejected for LPG storage had been used by TEPPCO for LPG storage from 1964 to 1984.

TEPPCO transferred its LPG from that cavern (reached by Wells 30, 31 and 45) and another salt cavern (reached by wells 27, 46 and 59) to a new site outside the Watkins Glen brine field. The DEC approved the move, granting TEPPCO a new underground storage permit in 1982. Once its new cavity was ready, TEPPCO removed its LPG from the old caverns and plugged the entry wells.

TEPPCO officials declined to say why the company switched storage sites, and the DEC said it had no records to explain the move.

Concerns about structural integrity of the caverns is one possible explanation.

In the years before TEPPCO applied for its new permit, the Jacoby study had gained significant notice. For example, it was cited in an exhaustive 1979 report for the U.S. Department of Energy on potential New York sites for storing high-level nuclear waste.

The authors at Stone and Webster Engineering Corp. concluded that no sites in the Finger Lakes region were appropriate for nuclear waste without further study of the area's extensive faulting. Stone and Webster listed the Watkins Glen fault identified by Jacoby as the longest strike-slip fault in the region—70 miles—and the one showing the greatest displacement—about 1,200 feet.

Sevenker, the Louisiana engineering consultant, said DEC officials in Albany had once shown him maps that indicated the Well 58 was drilled into a fault zone. "This well had been drilled right through an almost vertical fault," Sevenker said in an interview late August.

Even so, Sevenker said he was surprised by TEPPCO's decision to move its LPG from caverns adjacent to Well 58. He said he suspected the reason had more to do with brine disposal challenges than cavern integrity. He recalled that the TEPPCO caverns had been "very tight," and that very little, if any LPG had leaked. "From an operating standpoint, I can't see why they left," Sevenker said. "I would doubt structural security was the reason."

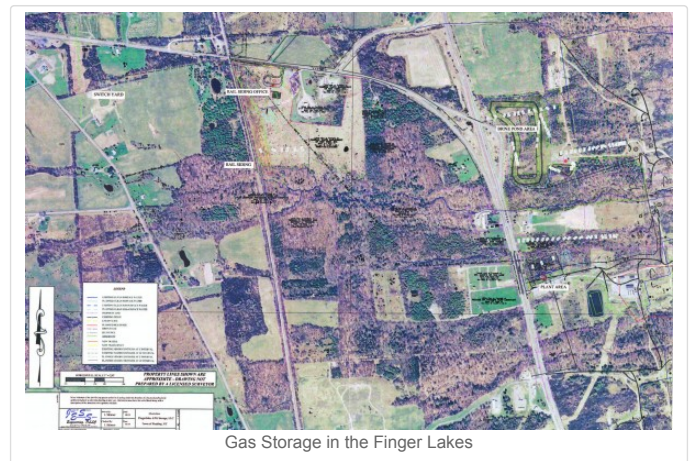
NYSEG also seemed satisfied with the stability of the two former TEPPCO LPG caverns because it began leasing them from US Salt in 1995 for compressed gas storage. Inergy bought the two caverns from NYSEG in 2011, and stated in its annual report to the SEC, "As of Sept. 30, 2012, 100 percent of (Inergy's Seneca Lake compressed gas) storage capacity is contracted."

The gas stored in the Seneca Lake brine field comes from Marcellus shale drilling. The LPG it plans to store nearby includes butane from Philadelphia refineries and propane processed from Marcellus shale drilling, according to an 2010 interview Moler gave with the industry trade publication Gas Storage.

Inergy's plan calls for LPG to be injected during summer months and withdrawn during winter months as demand rises. When LPG is withdrawn, brine is to be injected to help maintain cavern pressure. When LPG is added, the brine is to be piped away to one of two new open brine pits.

But managing brine used in LPG storage can be challenging because the pits can overflow. Inergy's LPG storage facility in Bath has a state permit to discharge brine into the Cohocton River.

In his 2010 interview with Gas Storage magazine, Moler said Inergy bought US Salt for two reasons. "First, it gives us a way to dispose of brine in the Northeast, which can be a significant technical impediment to developing salt-cavern storage. Second, we picked it up so we could have available pre-solution-mined cavern space to



Gas Storage in the Finger Lakes

store natural gas, propane and butane.”

Inergy plans to link the brine used in LPG storage to an existing US Salt brine pit that has long been used in salt mining operations, providing a potential indirect route to discharge into Seneca Lake.

In 2010, US Salt applied to the state for an increase in its chloride discharge limit from 30,000 pounds per day to 44,000 pounds per day. In a 2010 letter, an attorney for Inergy stressed that US Salt’s bid for a permit modification “has absolutely nothing to do with the (LPG project) application.”

Asked in December 2012 whether brine from the LPG project could flow into Seneca Lake, DEC spokeswoman Linda Vera said: “There is no proposed direct line from

the two Inergy ponds to the lake. Brine from the two ponds may flow to the US Salt brine pond for use as ‘feed stock’ in salt production.”

Brine disposal into Seneca Lake is a sensitive issue because Seneca is by far the saltiest of the Finger Lakes. Also, the intake pipe for the Village of Watkins Glen’s water system is located midway between the discharge pipes of US Salt and Cargill, which operates its own salt plant at the southern end of the lake three miles away.

Cargill dumps brine into the lake under a state license that allows 34,000 pounds of chloride per day.

EPA records show that Cargill has not exceeded its effluent limit once within the past three years, but US Salt has exceeded its limit 19 times. In fact, the plant has been out of compliance for each of the last 12 quarters, according to an EPA report generated Jan. 3.

Between 2008, the year Inergy acquired US Salt, and 2011, the plant’s total effluent discharges into the lake rose by 71 percent to 35.3 million pounds, EPA records show. Discharges into the lake of its leading pollutant, chloride, rose by 76 percent to 12.1 million pounds.

In a 2012 report on Seneca Lake’s water quality, Prof. John D. Halfman of Hobart and William Smith Colleges in Geneva made indirect reference to Inergy’s gas storage activities.

“Permitted discharges should be evaluated to assess the impact on the lake and its ecosystem,” Halfman wrote. “For example, more research is required to determine the source and fate of chloride and sodium salts in the lake from mining activities, application of road salt and potential storage of gas in the abandoned salt caverns.”

Two embarrassing brine pollution incidents occurred in the final weeks of Moler’s reign as the point man for Inergy’s LPG project, fueling opponents who were organizing the August 17 protest march.

Only days before the march, Campbell of Gas Free Seneca had put the company on the spot by posting on YouTube a video of a swath of burned out vegetation on Inergy property on the hill above the lake.



Seneca Lake

Inergy had not notified the DEC of a brine leak. But shortly after the YouTube clip was forwarded to the agency, the company reported—almost three weeks after the fact—that a leak “1/16th of an inch in diameter” in a brine pipe weld had allowed a “spray/mist” to escape for an estimated 43 hours. Before it was repaired July 16, a total 1754 gallons of brine were released onto the ground, Inergy estimated.

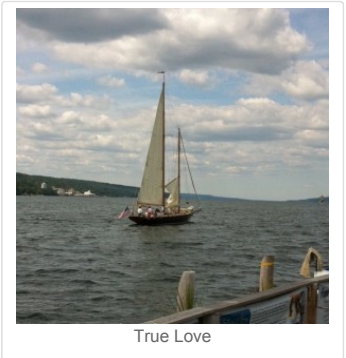
Eyewitness accounts suggested the reported volume of the leak may have been understated.

On a near-perfect day July 14, the schooner “True Love” set sail from Watkins Glen on a routine Seneca Lake tourist cruise. Rock cliffs dominate the eastern shoreline, and the salt manufacturing plant below Inergy’s brine field stands out on the western shore. But that day, the western shore featured a special visual attraction: a white geyser.

“It shot up about 100 feet—over the trees,” said Larry Hacker, the schooner’s captain. “At first it actually looked like smoke. We knew it was salt. You could see white in the trees and we were a mile and a half away.”

Asked whether the reported 1,754 gallons of brine could have sustained for nearly two days the geyser he witnessed on the cruise, Hacker declined to speculate.

Three days after Inergy’s belated report, the company acknowledged another accident. This time 15,000 gallons of brine spilled directly into Seneca Lake.



True Love

INERGY TIMELINE

1893	First well is drilled to mine salt on the southwest shore of Seneca Lake.
1964	TEPPCO begins storing LPG in salt caverns just north of Watkins Glen. 1
1973	Geologists Jacoby and Dellwig write paper analyzing extensive faults in in brine field north of Watkins Glen.
1979	Stone and Webster Engineering Co. concludes Finger Lakes area salt caverns are unfit for storing nuclear waste due to geologic faulting.
1984	TEPPCO abandons LPG storage in salt caverns.
1992	Akzo drills Well 58 as brine well with plans to eventually use it for gas storage.
1995	NYSEG leases caverns TEPPCO had used for LPG storage and begins using them to store natural gas.
Jan. 17, 2001	Gas leaks from salt cavern storage facility in Hutchinson, Kansas, trigger explosions that kill two people.

Feb. 3, 2001	Earthquake measuring 3.2 on Richter scale is centered in Bath, 25 miles from Watkins Glen.
Feb. 12, 2001	Well 58's roof collapsed "sometime prior" to this date, according to DEC's Kathleen Stanford.
Mar. 19, 2001	DEC's Stanford asks US Salt to update status of Well 58 in light of Hutchinson, Kansas, accident.
May 14, 2001	US Salt's Alan Parry tells DEC company will plug and abandon Well 58 because the cavern's roof collapsed, possibly due to an earthquake.
Oct. 14, 2003	Well 58 plugged and abandoned
Aug. 2004	Gas explosions rock salt cavern storage facility in Moss Bluff, Texas.
Aug. 11, 2008	Inergy announces plans to buy US Salt's caverns and operations north of Watkins Glen.
Oct. 10, 2009	Inergy seeks underground storage permit for LPG at Watkins Glen site.
May 17, 2010	Inergy provides DEC confidential "reservoir suitability report."
Jul. 2011	Inergy buys NYSEG's gas storage operations and pipelines at the salt caverns north of Watkins Glen for \$66 million.
Jul. 14, 2012	Seneca Lake boaters report brine "geyser" on Inergy property.
Aug. 2, 2012	Sinkhole swallows earth and trees next to Louisiana salt cavern holding nearly 1 million barrels of liquid butane.
Aug. 3, 2012	Inergy reports brine spills to state regulators.
Aug. 16, 2012	Inergy's William Moler writes in Elmira newspaper column that Inergy proposed storage facility will not store natural gas.
Aug. 17, 2012	Several hundred protestors march in Watkins Glen against Inergy's LPG and gas storage plan.
Oct. 5, 2012	Effective date of William Moler's resignation as Inergy's point man for the Watkins Glen gas and LPG storage project.

Karen Map

Sanford Letter

New York State Depar
Division of Mineral Resou
Bureau of Oil and Gas Regulati
605 Broadway, Albany, New York

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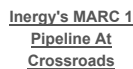
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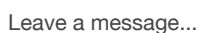
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As always, outstanding investigative journalism. Please accept strongest thanks for the grace and dedication that this effort exudes.

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