

Morro Bay, California's Version of Flint Michigan

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One of the most precious commodities a community has is clean water and sanitation. Both are critical to maintaining good public health. Unfortunately, Morro Bay has a nearly two-decade long history of providing sewage contaminated water to its residents and visitors.

The City has distributed the contaminated water into their water distribution system every November when annually the State water system is shut down for maintenance. That also is when the water has a foul odor. The City says it is due to "treating" the water from the Lower Morro Valley wells. As Morro Bay residents, my wife and I have resorted to using bottled water for cooking and drinking during this time of year to avoid ingesting viruses and organic impurities that are contained in the City's water system.

As a research scientist with a Ph.D. in chemistry I finally decided to investigate the history of this practice to better understand the what, when, where and why for this unhealthy practice. Below is an interesting timeline of key events that are difficult to find on the City's timeline of "milestones", presumably because they represent times when good leadership could have prevented dosing their residents with a witches-brew of nasty materials. Ultimately, Morro Bay is similar to Flint Michigan, only the contaminants the residents are exposed to are raw sewage derived rather than lead. The consequences of such exposure can be serious to one's health.

Public health and sanitation is an important, basic right that the City of Morro Bay is responsible to safeguard since it serves so many children, seniors, and visitors. Let me walk you through some particularly important milestones and the science that underlies them. First, in the Fall of 2002 the nitrate concentration in the Morro Valley well water jumped significantly above the maximum safe level for human consumption.¹ This was the first time since records were kept for the city wells. Unfortunately, the levels have not come back down, indicating that something dramatic and systemic had changed in 2002.

In 2002 the problem was "solved" by diluting the well water with State water until a "safe" regulatory nitrate level was achieved. I say "safe" because it definitely depends on the source of the nitrates. If it is from fertilizer or other man-made nitrate compounds, only then can dilution be an acceptable practice. Of course, a better practice would be to eliminate the nitrates altogether via reverse osmosis or ion exchange, so they are not present at all.

Nitrates are a known health hazard and are classified as a carcinogen by the World Health Organization. Fetuses, children and the elderly are the most vulnerable to the consumption of nitrates, which among many other sources include cured meats such as sausages and bacon. State water regulations require drinking water to have less than a 45 milligrams per liter nitrate concentration.

If the nitrates come from sewage, there are a significant number of other contaminants accompanying them. Sewage contains viruses, bacteria, microorganisms, both legal and illegal

drugs, and their metabolites from the body processing these organics to enable excretion. The number of ethical drugs is in the many hundreds, possibly thousands. Just look at the shelves in your local pharmacy. They treat heart conditions, anxiety, fertility, diabetes, clotting, cancer and many, many other maladies. Ingesting these when you do not need them is risky. Ingesting a plethora of them simultaneously is unwise and unsafe.

The elevated nitrate levels in Morro Bay's well water started in 2002 when they skyrocketed well above the 45 mg/L concentration level so the City diluted it with State and Desal water until it reached the 45 mg/L level. Their annual report for the first time did not report the actual nitrates level in the well water. Instead they put the well water into the Kings Street tanks and adjusted the nitrate concentration to the legal requirement.¹ This is fine if the nitrates are from fertilizer, but if they are from sewage, the other sewage components are still present in the drinking water.

A simple analogy is, if you were offered the chance to have a shot glass of sewage contaminated water, would you prefer to be able to dilute it with a 6 ounce glass of water, an 8 ounce glass, even a gallon of water or possibly chug it without dilution? Of course the preferred answer is you do not want that shot of contaminated water no matter how dilute it is. It is perfectly clear that no amount of dilution would reduce the quantity of pollutants you would ingest and that is why **dilution is not the solution** to the problem.

Annual reports from the City for the years 2003,² 2004,³ 2005⁴ and 2006⁵ all resorted to dilution. This means, if the nitrates were from sewage, the residents of Morro Bay and its visitors were being dosed with untreated sewage. The amount of contamination corresponds to the quantity of well water pumped during the State shutdown. Dilution results in the sewage remaining in the drinking water.

An interesting, accidental experiment was run in early November of 2006 when insufficiently diluted well-water was directly pumped into the potable water system of the City.⁶ Apparently, it took the City several days to discover their mistake, but in the interim some children (unclear how many) came home from school with stomachaches and some elderly residents reported respiratory issues. The City corrected their mistake as soon as they discovered it and notified the citizens that unsafe levels of nitrates had contaminated the drinking water. I do not know how long it would take to flush the "spike of nitrates" from the water system, but the warning to the citizens lasted for 36 hours. Also, not being an M.D., I seriously question whether a nitrate spike to 89 mg/L would be high enough to cause such a broad range of symptoms. Raw sewage is a more probable cause. If that is the case, the diluted sewage has been in the drinking water every subsequent November.

This incident finally encouraged the City to commission a study on the source of the Morro Bay Basin nitrates. The Cleath Report addressing nitrate source was issued in December 2007.⁷ It contained a significant amount of analytical data including all-important nitrogen isotope ratios on the nitrates in the well-water. Ultimately, they concluded their original hypothesis, that the nitrates in the well-water came from farming, was correct. Unfortunately, they misinterpreted their data and three months later a citizens group corrected the report showing conclusively that the nitrates were from raw sewage.⁸ The citizens report was

distributed to the City, the California Coastal Commission (CCC) and the Regional Water Quality Control Board (RWQCB), among others.

The only reasonable source of the raw sewage was the sewer lines in North Morro Bay. Maintenance of these lines had been neglected for many years and they were known to be leaky well before the 2002 nitrate spike. This means there is an underground path to the well field from the North Morro Bay. This should not have been surprising. The MTBE remediation project, which ended in 2002, included the drilling of numerous monitoring and extraction wells into the aquifer. The leaky Main Street sewer main runs right past the Shell Station. Before the remediation work breached the aquifer, there was no nitrate problem in the well-water. That problem began with the first use of the wells after the remediation project concluded.

The only regulatory agency that took any action was the California Coastal Commission and they sent the City a notice about the modifications to their sewer plant that included correcting breaches in their wastewater pipes to avoid cross contamination of their potable wells.⁹ Speculation is the RWQCB took no action fearing that they may have caused the sewage to reach the well field due to the MTBE monitoring wells. They required Morro Bay to drill these wells to evaluate the underground plumes of this gasoline additive. Unfortunately, no action was ever taken by the City to comply with the CCC notification.

Six years after the nitrate source was correctly determined, the RWQCB agreed to hear a presentation on the sewage contamination of the Morro Bay well field.¹⁰ To be sure the data was valid, they ordered the wells to be tested for sucralose as an independent confirmation the nitrates were not from fertilizer. The tests were completed in early 2015 and they showed significant concentrations of sucralose in all wells downgradient of the sewer line. Since sucralose comes from human waste only (it has no functional value to farmers), there now were two independent proofs that sewage was in the well water. The first in the 2008 citizen's report correcting the Cleath report⁸ and the second in 2015 confirming sucralose in the wells. A total of thirteen years had elapsed since the 2002 spike in nitrate levels in the Morro wells.

In 2015 the City of Morro Bay passed a Proposition 218 to fund the repair of the sewer lines as well as to build a new sewage treatment plant. This should have been a significant step forward to eliminate exfiltration from the N. Morro Bay sewer lines and to solve the contaminated drinking water the citizens had been exposed to since 2002. It is now 2019 and not a penny of those funds has been spent on repairing the lines. This public health threat is nowhere near being addressed.

In fact, in the Spring and Summer of 2018, the City told the residents on multiple occasions during City Council meetings that they never had any intention to utilize the funds approved in 2015 as specified in the Proposition 218. They were seeking a second Proposition 218 to fund a new, larger sewer treatment plant. There was no mention of repairing the leaking sewer lines.

Now, the city is proposing^{11,12} to recycle treated wastewater, from the new sewer treatment plant yet to be built. They propose to use the Lower Morro Valley underground riverbed to

remove sewage contaminants not removed by reverse osmosis. Unfortunately, there is no way to get the treated water out of the ground except to use the contaminated Morro Valley wells. This would reintroduce raw sewage into the recovered water making it unfit for human consumption again. Another reverse osmosis treatment and even chlorination will not accomplish this. They would have never pumped RO water into the ground if it were fit for human consumption. If they simply resort to filtration and sterilization to purify this recovered water, they will be distributing sewage-contaminated water to the City not just one month a year, but **daily**. This would be a significant magnification of the unhealthy practices the City has followed for the past 17 years. Remember, dilution is not the solution. Only the right kind of aquifer, preferably a contained aquifer, will do this task. Unfortunately, Morro Bay has not been blessed with such an aquifer.¹³

The history covered here raises a number of disturbing features about not only City Government but state regulatory agencies and even County government. As a voting resident of Morro Bay I feel obligated to see what can be learned so that I can help be part of the solution and not perpetuate the unacceptable status quo.

First, let me say I am not an attorney and can only use non-legal terms with laymen meanings. I am sure a legal definition of these terms has many nuances that require legal training to accurately use. I will limit my use to the meanings given in common dictionaries for both “misfeasance” and “malfeasance” going forward.

The definition of *misfeasance* is the performance of a lawful action in an illegal or improper manner or an improper and lawful execution of an act that in itself is lawful and proper.

The definition of *malfeasance* is a knowing misconduct or wrongdoing, especially by a public official having prior knowledge that it is unethical or unlawful.

Lets focus on the exposure of the general public to contaminated drinking water and ultimately subjecting the public to such water. The critical time that raised serious issues occurred in 2002 when the level of nitrates in the Morro Bay wells “suddenly” increased by 2-3 times historical levels exceeding the State mandated tolerable levels for human consumption. The Public Works department took immediate action to protect the public, but there were some disturbing actions also taken. Instead of clearly reporting the well water concentrations, as historically done, they reported the level they diluted the nitrates down to in a large water tank. This reeks of a lack of transparency even though they did not falsify any data; they caused endangerment to public health.

Presumably, in 2002 they thought this was a surprising, one-time occurrence and everything would return to normal the following year. Their actions certainly deferred the determination of the root cause of the contamination by not assuring it was a one-time occurrence. Unfortunately, the problem did not go away in the following years and not determining the source of the nitrates prevents an appropriate remediation action. As pointed out earlier, the methodology to deal with fertilizer-derived nitrates is dramatically different from what needs to be done with sewage-derived nitrates. Inappropriate actions could subject the public to

serious health risks. Sewage-derived nitrates makes the water unfit for human consumption and dilution does not solve the problem!

In the intervening years to 2006 it seems bad decisions were stacked on top of each other to avoid facing the true problem. It is difficult to imagine that after 5 years the City did not know they had a serious problem. Certainly, their actions fit into the misfeasance description because ultimately they did not officially know what was happening with their wells but they must have had suspicions.

The 2006 mistake exposing the public to insufficiently diluted well water, while corrected quickly, let the City know there was something in the well water that was harmful to human health. Their action to get a study to identify the source of the nitrates was long overdue. Unfortunately, it appears the report was supposed to prove fertilizers used in the Lower Morro Valley farms was the source and that is what they got. The report hid key data in the appendixes and the conclusions based on the data in the general discussion area were feeble. This delayed for a minimum of three months the true source of the nitrates being disclosed. It indirectly delayed actions on the nitrate problem much longer because the report by independent citizens was ultimately questioned for its veracity.

As serious as the consequences were from the incorrect Cleath report, it still only sounds like this is misfeasance. If there were different degrees of misfeasance, this would have to be at the serious end. At the end of 2008 the Coastal Commission did take action, possibly based on the Cleath correction report, to request the City to repair its leaky sewer pipelines. Unfortunately, it appears they did not follow through to see that the work was done.

From 2008 forward the source of the nitrates was established but no effort was made to eliminate the health hazard the residents of Morro Bay faced yearly. It is hard not to refer to the City's lack of action as anything other than malfeasance since it was crystal clear that their residents' health was being compromised annually. Likewise, the RWQCB waited 6 years before they sat down to hear the evidence showing the Cleath report was incorrect. The only action taken was to challenge the veracity of the data and request that the wells be tested for sucralose. When the 2015 results showed significant levels of sucralose in all wells downgradient of the sewer lines, they asked the City if they had sufficient water without using the wells. The City replied affirmatively indicating the quality of the groundwater was not an issue for Morro Bay. This settled the issue for RWQCB. They have not checked to see if the wells have been used since 2014, but they are still being used through 2018. This lack of action certainly is malfeasance.

In 2015, the City of Morro Bay passed a Proposition 218 specifying a funding amount for repairing the sewer lines as well as sufficient funds for a new sewer treatment plant. This should have finally addressed the 14-year health issue, but nothing was done and in 2018 the City came back to the property owners for another Proposition 218 for a new sewer treatment plant. Their arguments were that they *never intended* to use the money from the 2015 Proposition 218 to repair the sewer lines or build a new sewer. As of 2019 they have not spent any of the money to repair the lines. They still have not taken any actions to solve the

contaminated wells and drinking water. From a laymen’s perspective, this certainly constitutes malfeasance.

To add insult to injury, the City’s current plan for recycling treated wastewater involves injecting it into the Lower Morro Valley and recovering it in the contaminated well fields magnifying the health risks. The well-recovered water will be re-contaminated with raw sewage and not be fit for human consumption. Furthermore, the intent is to use this contaminated water on a daily basis increasing the frequency of exposing the residents to tainted water from a month each year to every day. From a layman’s perspective this qualifies as malfeasance and I believe the adjective arrogant should be added to the description.

Lastly, there is plenty of blame to go around for not only the City of Morro Bay, but for the State Regional Water Control Board and the California Coastal Commission, County Public Health, and the Board of Supervisors of San Luis Obispo County. At the July 2019 CCC meeting in San Luis Obispo, they all relinquished their oversight of the permitting process for the Morro Bay Sewer project to the City of Morro Bay, eliminating public hearings for citizens to make public comments to other regulatory bodies on any aspect of the largest and most controversial project the City has ever undertaken. It is definitely clear there is no one looking out for the health of the citizenry of Morro Bay and the health of the Morro Bay National Estuary.

This is not how participative democracy should work. The government has been secretive and non-transparent, primarily because they know that the residents of the town would not support their actions.

Polluted Drinking Water Timeline

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| 2000 | (May-Aug.) Study of MTBE contamination of Morro Bay Well field proven to come from Shell Station at Route 41 and Main Street. The sewer line in North MB runs under Main Street past the old Shell station to the sewer treatment plant west of the wells. |
| 2001 | Remediation work on the MTBE plume began. |
| 2002 | Remediation work on the MTBE plume started in 2001 was completed. Morro Bay’s well field nitrate level exceeds regulatory maximum for safe human consumption for the first time since record keeping began. This unsafe level has remained high for the ensuing 17 years with no remediation in sight. The contaminated water was diluted with State water and desal water and the diluted nitrate levels were reported. ¹ |
| 2003 | (April) San Simeon Earthquake. The contaminated well-water was diluted with State water and desal water and the diluted nitrate levels were reported. ² |
| 2004 | The contaminated well-water was diluted with State water and desal water and the diluted nitrate levels were reported. ³ |
| 2005 | The contaminated well-water was diluted with State water and desal water and the |

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| | diluted nitrate levels were reported. ⁴ |
| 2006 | Nitrate contaminated well-water exceeding the maximum acceptable safety level was added directly to Morro Bay's drinking water undiluted and delivered to its residents. Children reported stomach pains and the elderly complained of respiratory issues. ^{5,6} |
| 2007 | (Dec.) The Cleath report on Morro Bay basin nitrate levels issues incorrectly claimed the source of the nitrates was fertilizer. |
| 2008 | (April) Sadowski and Bruton report corrects the Cleath report using Cleath's data proving the major source of nitrates is from sewage. ⁸ (Dec.) The CCC sends notice to Director of Public Services, Morro Bay for them to correct breaches in the City's wastewater pipes to avoid cross-contamination of their potable water wells. ⁹ |
| 2009 | |
| 2010 | |
| 2011 | |
| 2012 | (March) DUDEK Recycled Water Feasibility Study showed that due to poor hydrogeology in the Lower Morro Valley recycling water was neither reliable nor economic. |
| 2013 | |
| 2014 | (May) Presentation by Linda Stedjee and Marla Jo Bruton to the RWQCB regarding the sewage contamination of the Morro Bay well field. ¹⁰ The Board requested the wells to be tested for sucralose to confirm the contamination. |
| 2015 | Tests confirm significant concentrations of sucralose in all wells downgradient of the sewer lines. The City claimed they had sufficient water without using the wells so that the quality of the ground water was not an issue. (May) Proposition 218 approved with sufficient funds specified for both sewer line repairs and funds for a new sewer treatment plant. As of 2019 this money has not been spent on the listed items |
| 2016 | Fugro Report Confirms the DUDEK report that the likelihood the Lower Morro Valley would not provide a robust aquifer for recycling reclaimed water. ¹⁴ |
| 2017 | (May) GSI Report on Lower Morro Valley Basin screened groundwater modeling for injection feasibility issued suggested a 2-month retention in the Lower Morro Valley riverbed followed by extraction using the Morro Bay well field, they may be able to recycle treated wastewater. ¹¹ |
| 2018 | A second Proposition 218 to finance the sewage treatment plant was passed by the city overlapping the 2015 Proposition. |
| 2019 | (April) GSI Technical Memo on Groundwater Modeling issued. This flawed report is at best premature and more likely fatally flawed raising issues on the quality of the groundwater model and the viability of a recycling process where half or more of the water is lost. The recovered water is re-contaminated with sewage so it is still not fit for human consumption without RO treatment/aquifer treatment/ <u>clean</u> extraction process. There is no such aquifer in Morro Bay with this capability. ^{12,13} (July) CCC voted to consolidate planning with City of Morro Bay so as to shut off oversight from other organizations and the public in spite of the fact that this would mean contaminated water would be provided to residents of Morro Bay on a |

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| daily basis. |
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About the Author

EDUCATION

- AB degree in Chemistry from UCSD with a minor in Economics.
- Ph.D. from UCLA in Chemistry.
- Two-years post-doctoral research at MIT.

CAREER

- Assisted in the establishment of three new ventures, two of which were purchased by major pharmaceutical companies.
- Research scientist at four major Pharmaceutical companies between his stints with new ventures.
- Ran large multidisciplinary research groups and has overseen \$100 million international collaborations.
- Currently an Associate Editor for a prestigious, international chemistry journal sponsored by the American Chemical Society.
 - Editorial responsibilities - analyzing about 80 - 110 major research reports every year to validate that the data meets the highest scientific standards and supports the author's conclusions; only then these reports are disseminated for peer review with possible publication.