PEER

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FOULING OUR NEST

Gross Negligence at the Missoula Wastewater Treatment Plant

October 2000

About PEER

Public Employees for Environmental Responsibility (PEER) is an association of resource managers, scientists and biologists, law enforcement officials and other government professionals committed to upholding the public trust through responsible management of the nation's environment and natural resources.

PEER advocates sustainable management of public resources, promotes enforcement of environmental protection laws, and seeks to be a catalyst for supporting professional integrity and promoting environmental ethics in government agencies.

PEER provides public employees committed to ecologically responsible management with a credible voice for expressing their concerns.

PEER's objectives are to:

1. **Organize** a strong base of support among employees with local, state and federal resource management agencies;
2. **Monitor** land management and environmental protection agencies;
3. **Inform** policymakers and the public about substantive issues of concern to PEER members; and;
4. **Defend** and strengthen the legal rights of public employees who speak out about issues of environmental management.

PEER recognizes the invaluable role that government employees play as defenders of the environment and stewards of our national resources. PEER supports resource professionals who advocate environmental protection in a responsible professional manner.

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About This Report

Fouling Our Nest lays out the serious environmental and public health problems caused by poor management of Missoula's Waste Water Treatment Plant.

This white paper was written by current and former employees of the Missoula Waste Water Treatment Plant. The incidents described in the report can be found in plant records and logbooks.

While the matters described in this report are serious, they are also everyday occurrences. Consequently, even when major incidents take place, a "business as usual" atmosphere pervades the plant.

The authors decided to write this white paper only after concluding that further attempts to raise these issues within their own chain of command or with responsible elected officials would be futile. The authors also choose to remain anonymous not only to avoid retaliation but also to better let the incidents described speak for themselves.

Beyond outlining the plant operational problems, the report contains recommended steps to address the problems. By using non-technical language to describe the challenges facing Missoula's sewage system, the authors hope to trigger a public discussion about resource choices and agency accountability.

PEER is proud to assist conscientious public servants who have dedicated their careers to the protection of our natural resources and the faithful execution of environmental laws.

Jeff Ruch

PEER Executive Director

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I. Executive Summary

Missoula's Waste Water Treatment Plant is plagued by spills, bypasses and potential "backflows" which pollute the Clark Fork River, contaminate the groundwater aquifer and threaten the safety of the plant's own drinking water supply. In addition, due to equipment breakdowns, the plant is emitting hazardous methane gas and has suffered mercury spills.

The chronic problems at the Missoula Waste Water Treatment Plant have been masked by upper management negligence and a system of cover-ups. Plant workers are ordered to manipulate fecal coliform tests and discouraged from reporting deficiencies. Compounding these difficulties is the lack of proper plant operator training and certification together with a city political leadership that has made it clear that it wants to hear no bad news out of the sewage plant.

The Missoula Waste Water Treatment Plant sits on the banks of the Clark Fork River, one of Montana's most prized streams for fishing and recreation. Unfortunately, the plant has experienced a number of failures causing untreated or partially treated sewage to flow directly into the Clark Fork River or to contaminate groundwater:

- **Sewage Bypasses.** Sewage overflows have become common. While some spills are small, several recent bypasses been quite large — one spill in November 1999 spewed more than 160,000 gallons of sewage into the Clark Fork River. When equipment breakdowns occur at night, responses are slow or delayed both because the plant alarm is unreliable and, more disturbingly, because negligent supervisors ignore the alarm altogether. Although sewage spills have been numerous, the precise number and extent of bypasses is difficult to document, not only because plant records themselves are incomplete but also because plant management actively discourages staff from reporting violations.

- **Sludge Tainting Groundwater.** Due to system backups and clogs, overflows of sewage sludge escape containment areas and seep into the aquifer under the plant.

- **Backflow Threat to Drinking Water.** Improper backflow prevention devices used at the plant enable sewage to contaminate the plant's drinking water supply. This type of contamination carries with it the risk of public health emergencies from an array of waterborne diseases.

Aside from the bio-hazards associated with mishandling fecal matter in the raw sewage, the Missoula Waste Water Treatment Plant has irresponsibly handled toxic chemicals and compounds:

- **Methane.** Poor management and lack of equipment maintenance have contributed to a serious problem of methane gas at the plant. Methane discharges have rotted out plant piping as methane leaks have become a daily occurrence.

- **Mercury.** Mercury spills from plant equipment have been swept up with brooms and sent to the city landfill. Similarly, approximately 400 faulty mercury float switches from the STEP system have also ended up at the local dump.

- **Hazardous Wastes.** Despite the fact that the plant is not equipped to accept hazardous wastes, acids, pesticides and other chemicals collected by the City of Missoula at the annual "Hazardous Waste Collection Day" are dumped directly into the treatment process.

Missoula

Unfortunately, funds to maintain the Missoula Waste Water Treatment Plant have been spent on the disastrous STEP program. Ironically, the idea behind STEP was to provide a leak-proof septic tank but in practice it has been far more leak-prone than leak proof. Beyond the time and money spent to respond to the more than 2000 repair calls on only 1400 units, seepage from faulty STEP units have caused house foundations to sink, sewage swamps in backyards and innumerable sinkholes, including one which gave way underneath a heavily-loaded truck.

The system failures have been hidden from public view by a departmental culture of covering up problems and retaliating against those who step forward:

- An unapproved chlorine testing procedure was introduced at the plant in 1993 in order to obscure water quality violations;
- The plant frequently runs without licensed supervisors or properly trained and certified operators; and
- Plant workers who have reported problems have been removed or punished. Plant staff willing to mask or cover up problems are promoted.

Worker reports of problems to the City Administrator and mayor have gone unanswered. In fact, Missoula Mayor Michael Kadas recently awarded the plant's operations division a special Certificate of Appreciation for its exemplary clean water discharge record.

II. Sewage Treatment 101

For thousands of years, sewage treatment has been an integral part of municipal development. Proper removal of solid waste and disease-causing microorganisms continues to be a challenge as growing populations put increasing pressure on dwindling supplies of clean fresh drinking water. Today, wastewater treatment plants act as the first line of defense between communities and widespread disease.

A (Very) Brief History of Sewage Treatment

As population pressures began to bear down on ancient Rome, people needed to find an efficient way to dispose of human waste. Around 800 B.C., Roman citizens began throwing their waste into a large canal, the Cloaka Maxima, which carried the pollutants out of the city, emptying into the Tever River. Over the centuries, the empire constructed an elaborate network of sewage canals that carried wastewater away from private homes and buildings. The ancient sewers also provided drainage for low areas of the city that became swampy after hard rains—and provided a model for waste disposal that lasted for centuries.

It was more than 2,500 years before chemical processes were utilized to disinfect wastewater. In 1879, Englishman William Soper treated the feces of typhoid patients with chlorinated lime before disposal into the sewer. Today, chlorine remains the primary method of disinfecting wastewater, although some municipalities have begun to experiment with ozone and even ultraviolet radiation.

Modern Wastewater Treatment

Though technology has evolved through the years, the concept behind modern wastewater treatment facilities remains simple— separate solid materials from the water and destroy any disease-causing bacteria, called pathogens.

Until the Clean Water Act was enacted in 1972, many facilities in the US required only the mechanical and hydraulic types of treatment utilized for centuries. Mechanical processes physically separate large solid waste from the water using screens, grates and filters. Hydraulic processes change the rate of water flow to separate smaller, dissolved solids and to separate oils. Only modern chemical and biological treatments, required by the Clean Water Act, remove more solids and destroy pathogens.

Modern wastewater treatment plants employ three phases in the treatment process:

1) Pretreatment

In the pretreatment stage, incoming wastewater is first run through a mechanical screen with 1-inch gaps to remove large objects from the waste stream such as roots, rags, cans and plastic. This debris can then be disposed of at a landfill.

The next step is a hydraulic process called grit removal. It is important to remove grit and sand early in the treatment process to prevent it from wearing down pumps and equipment later on. The water flow is slowed down to approximately 1.5 cubic feet per second, allowing the heavier sand, gravel, and other primarily inorganic materials to settle to the bottom of the basin for removal. If the flow is much slower than 1.5 cubic feet per second, too much additional organic material will also settle. Diffused air is then pumped into the wastewater in a process called pre-aeration, which helps separate oil from the water and freshen the wastewater.

2) Primary Treatment

Primary Treatment consists largely of sedimentation and flotation. Wastewater is collected into a basin, called a primary clarifier, and allowed to sit for up to two hours. About 60 percent of the settle-able solids will settle out on the bottom becoming sludge to be

The Regulatory Setting

The Clean Water Act also established a federal program to regulate discharges of pollutants into navigable waters. The National Pollution Discharge Elimination System (NPDES) permit system established federal standards for protecting water quality. The U.S. Environmental Protection Agency (EPA) has delegated the responsibilities for monitoring and enforcing the permits issued to industrial wastewater generators, such as sewage treatment plants, to ensure that drinking water supplies meet the federal standards. In Montana, the Department of Environmental Quality (DEQ) is the agency required to enforce NPDES permits.

In addition to water quality permits, the federal government sets standards for drinking water. As with NPDES, this authority is also delegated to the states, and, in Montana that agency is the DEQ. States may enforce stricter standards than the national minimum but few states do. Thus, for example DEQ policy is to only monitor drinking water sources for water systems if more than 25 people regularly use the system. The drinking water for the Missoula Wastewater Treatment Plant comes from an on-site well. Even though there are now 26 full time users, and thousands of visitors using this water system each year, DEQ refuses to monitor this water supply.

pumped out for dewatering and disposal. Any floatable grease and scum is skimmed off the top at the same time and also pumped away for disposal.

3) Secondary Treatment

Secondary treatment employs biological and chemical processes to remove more solids and bacteria required by the Clean Water Act.

The most common biological treatment introduces microorganisms to eat suspended and dissolved solids. The organisms become heavy and sink to the bottom of the basin to be pumped away like the sludge in the primary clarifier.

Chemical processes are used to kill pathogens. Some common types of pathogens found in wastewater include typhoid, cholera, dysentery, polio and hepatitis. Wastewater plants test for the probability of pathogens in the water, and use oxidizers such as chlorine to disinfect the water or destroy bacteria.

The Missoula Wastewater Treatment Plant

The Missoula Wastewater Treatment Plant employs 18 people: 4 supervisors, 5 operators, 6 collections systems staff, 2 laboratory technicians, and 1 mechanic. Every day the Missoula Plant treats up to nine million gallons of wastewater before sending it into the Clark Fork River.

Plant Staff

Treatment Plant Operators manage the treatment processes and ensure that equipment operates properly. Because of the public health and safety responsibilities, most states require that a Plant Operator be certified. Montana certification requires two years experience as an Operator-in-Training, and passage of a state examination.

Treatment Plant Supervisors are responsible for all aspects of the plant. They ensure that the plant is staffed with qualified Operators and that equipment is maintained and replaced to meet public health and safety requirements. They must sign, under penalty of law, a monthly Discharge Monitoring Report (DMR). Supervisors are instructed to avoid any situations that could put employees or the public at risk, and are required to abide by all federal, state and local codes.

Collections Systems Staff maintain the entire system. They clean sewer lines throughout the city, and check and repair equipment.

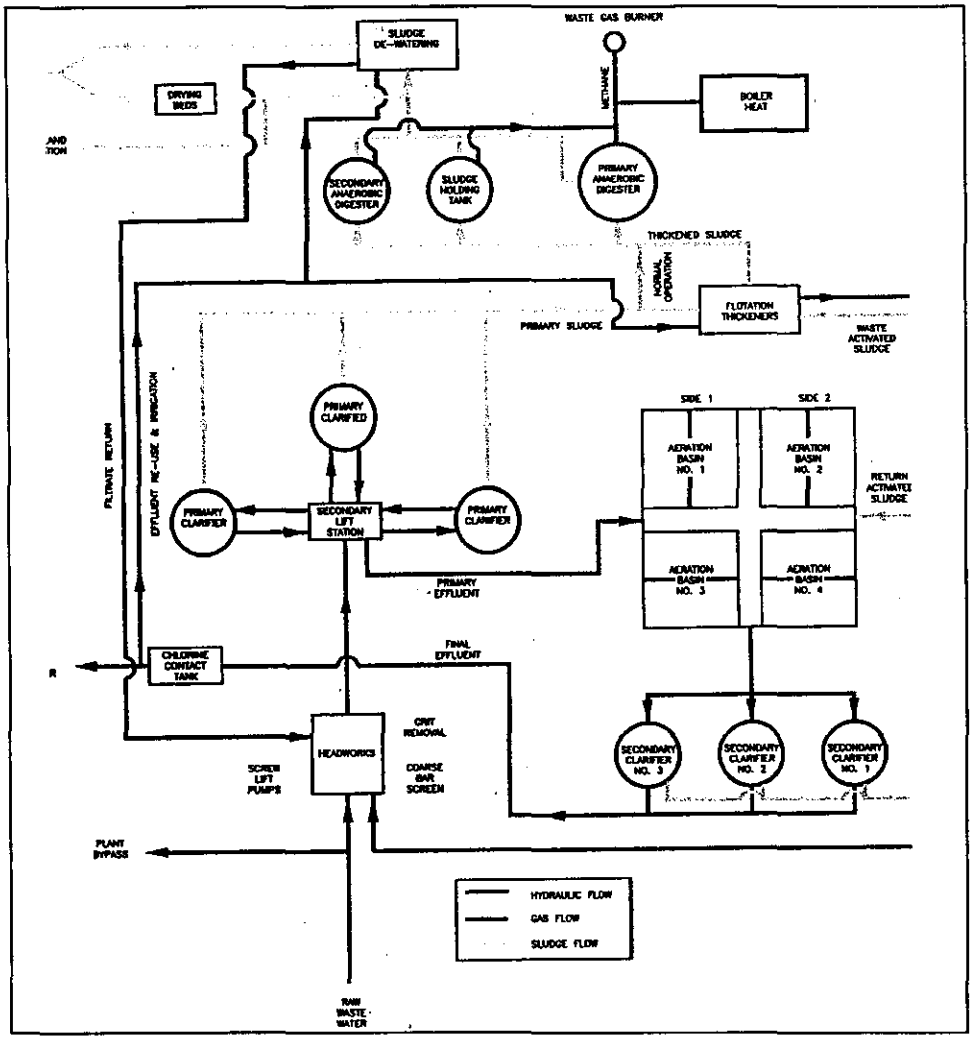


Diagram of the Missoula Waste Water Treatment Plant.

The Missoula Plant's Troubled Past

The Missoula Wastewater Treatment Plant has a history of violations of its discharge permit. Throughout the early 1980's, DEQ and the federal Environmental Protection Agency issued numerous notices of violation, but to no avail. Things got so bad that in April of 1986, EPA notified the state that DEQ had 45 days to exercise its oversight authority over the plant. The federal agency threatened to sue the City of Missoula itself if the state did not suitably intervene. Within days, the state of Montana had prepared its own lawsuit against the city.

After considering the DEQ lawsuit, the court found the plant in violation of its Montana Pollutant Discharge Elimination System (MPDES) permit in a number of ways. Among other things, the court found that the plant:

1) inappropriately sampled its discharge to the Clark Fork River for fecal coliform or chlorine,

2) failed to report the results of their samples to DEQ,

3) failed to report illegal discharges of partially treated sewage into the river, and

4) neglected to perform basic maintenance on operating equipment.

The ruling compelled the city to pay $8000 in civil penalties to Montana's general fund and $2,000 to DEQ's enforcement costs. Still more fines were levied several month later, when the city failed to comply with the court-ordered compliance schedule. The fines could have been much higher. According to state files, DEQ staff encouraged their agency, in March 1986, to file a lawsuit against Missoula that would impose civil penalties totaling nearly $500,000.

In addition, the city actually received permanent, relaxed fecal coliform bacteria limitations for their discharge, under the theory that cold Montana winters prevented the Clark Fork River from being a permanent "recreational" waterway. Also relaxed were disinfection requirements so that Missoula would no longer have to spend money chlorinating treated waste during the winter months. These adjustments continue to save, the city a great deal of money annually in equipment maintenance and sampling costs. They also may have sent a message to plant management that the state was not serious about enforcing environmental and health laws.

A River Runs Through It: The plant sits adjacent to the Clark Fork River.

III. Bypass Blues

In 1998, Missoula Mayor Mike Kadas presented the wastewater treatment plant's operations division a Certificate of Appreciation for its exemplary record of discharging clean water. The award implied that the wastewater plant had not violated a DEQ permit in the past year. It also saved the city money— the award came with a $4,500 permit cost reduction.

All in all, the certificate was a public relations coup for the Missoula plant; unfortunately, it was bogus. The previous September a plant accident had launched tens of thousands of gallons of partially treated sewage into the Clark Fork River. An operator who happened to witness the incident saw 7 to 10 large pieces of feces spew along the length of the Chlorine Contact Tank leading out to the river outfall. At the time, the operator pointed out the overflow to his supervisor, then-Operations Chief Starr Sullivan. Sullivan promised to "look into it" but neglected to even take the first step and isolate the outfall, a popular public access fishing hole. Sullivan also refused to report the violation to DEQ. No harm, no foul.

The decision to report, or not report, violations on the Discharge Monitoring Report (DMR) Form has more at stake than just the number on a list of violations. Missoula's annual permit fee paid to the State of Montana is lower in dollars when they don't report violations, an incentive to compliance created by the legislature and DEQ.

Sewage leaks and overflows like the September 1997 incident are known as "bypasses." Large bypasses can spew raw sewage into nearby aquatic habitats and groundwater, threatening local ecology and public health. In Missoula, bypasses are particularly threatening to the local ecosystem because the plant is built next to the Clark Fork River which in part recharges the Missoula aquifer.

Pump Problems

One of the most common causes of sewage bypasses at the Missoula Wastewater Treatment Plant from comes from defective effluent lift pumps. The pumps are designed to push wastewater from

Murky Waters: trash build-up inside an injection well.

Hear No Evil

In 1999, an operator with 30 years of experience with the City of Missoula retired in disgust over the continuing lack of professionalism during the last decade. He had been demoted for refusing to partake in unlawful activities. On his way out, the operator requested a meeting with Mayor Kadas to expose what was going on at the treatment plant. The mayor responded in front of witnesses, saying he was not interested in any documentation of wrongdoing at the plant.

That same month a different operator submitted a letter to City Chief Administrative Officer Janet Stevens requesting a one on one meeting to discuss and expose illegal activities going on at the treatment plant. The meeting was denied and the operator has since been the target of numerous fabricated disciplinary actions and continual harassment from the current management, including Starr Sullivan.

the primary treatment area upward to the secondary treatment chambers. When the lift pumps fail, the wastewater is not permitted to reach the secondary treatment process, and is released, partially treated, into the river.

The Missoula plant has had numerous lift pump equipment failures dating back to the early 1990s. The negligence of a few supervisors has prevented needed repairs from happening in a timely manner. Log book entries detail at least six failures between March and November, 1999 alone.

In one glaring example, plant employees recount an event from November 2, 1999. That morning, an operator noticed that the plant's primary pump had a high-temperature warning indicator on. The operator informed his supervisor, Operations Chief Gene Connell, and submitted a repair order. When the operator asked Connell about the problem later that day, he was told that the pump itself was fine, and that the high temperature indicator was defective.

According to the operator, the pump was abnormally hot to the touch—an obvious sign that it was overheating. Instead of having the pump fixed, Connell simply exchanged it's lead position with the lag pump for the day, but then switched it back to the lead position for the night. Log books from the subsequent days indicate that the high temperature indicator continued to warn that the pump was overheating.

Log books also note that the pump overheated and shut down in the middle of the night on November 5th. Operations Supervisor Connell made the entry:

"Primary lift station alarm #1 VSD shut down with high temperature. Lag pumps did not start up. Approximately 35 Min. primary bypass. 10:45 PM #2 pump in lead."

The 35 minute bypass spewed at least 160,000 gallons of sewage into the Clark Fork River. Still, it was six more days before Connell had the pump's defective cooling fan replaced.

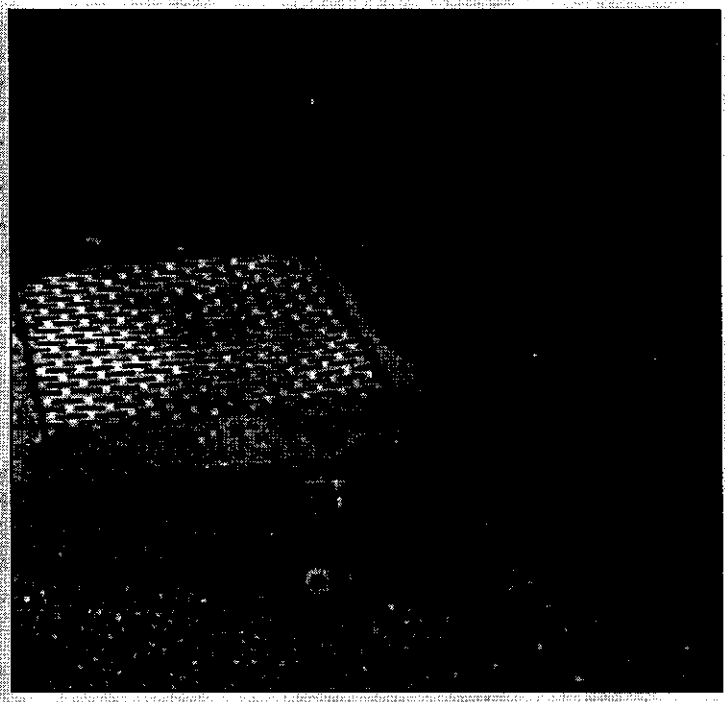
Asleep at the Switch

Many of the Missoula Plant's worst recorded bypasses are compounded when equipment breaks down in the middle of the night. While most wastewater treatment plants of this size are staffed around the clock to ensure proper monitoring and quick action, the Missoula Plant relies on an alarm system that pages on-call staff when equipment fails and bypasses occur. Not only does it take precious time for off-site staff to reach the plant, often having been roused from bed, but the alarm itself has proven unreliable and is continually under repair.

Further, the principal of an alarm system only works when conscientious employees are on call. Plant log books note that on-call supervisors sometimes choose not to respond to an alarm at all. A log entry from an operator's morning rounds on August 22, 1999 reports —

Not Fit For A Dog

The two shallow wells that provide the only potable water for both the wastewater treatment plant and the Missoula County Dog Pound lay within feet of the plant's injection wells—a repository for excess wastewater, oil and chemicals. Until recently, the treatment plant degreased its vehicles nearby and washed the excess into this injection well. At times the grit and rag truck was even washed out here on its way back from the dump. Every evening, the over spray from the wastewater lawn irrigation runs into the well. One of the injection wells has been so eroded over the years, that it is collapsing in on itself, and may be leaking into the drinking water supply. Coliform tests of the injection wells regularly indicate disease-carrying bacteria colonies "Too Numerous To Count" during the high aquifer level season.



Maintenance Issues: This eroded injection well has collapsed on itself.

"07:45 AM found #2 thickener alarm going off. Motor drive not working -WOW- on this Gene [Connell] acknowledged alarm at 12:17 AM, did not come in."

A disturbingly similar entry was noted on May 8, 1999, when Gene Connell had been filling in for an absent operator the day before:

"0830AM Rounds and equipment check found #1 and #2 heat exchangers plugged, found primary scum pits #1 and #2 full to the top and running down the driveway, also found primary pump #2 plugged with large stick and rocks, cleaned pump, pumped down scum pits and hosed driveway of grease and scum."

The term driveway here refers to the grade that drives water straight into an injection well. Connell had failed to pump the scum pits on his shift, and the sewage and scum subsequently flowed directly into the two injection wells in this area, contaminating the aquifer. These wells provide drinking water for plant employees, as well as to the county dog pound, which operates next door.

Screw Up and Move Up

The string of incidents in 1999 demonstrates that bypasses are common, but it would be impossible to quantify just how many health-threatening bypasses occur in Missoula each year. Plant employees contend that the very people responsible for reporting violations and keeping records of incidents are often the people with the most to lose for the disclosure — management.

The same month that the plant received the Mayor's award, then-Pretreatment Coordinator Gene

Connell told Laboratory Technician Sherri Kenyon that a good city employee did not report bypass violations at all, and that when he was an operator in the early 1990s, his policy was to never admit such incidents. Connell explained that the system rewarded operators who kept violations quiet. It certainly worked in his case. Gene Connell has been promoted twice with his "to get along you have to go along" philosophy.

Connell is not the only person singled out for promotions after refusing to report violations. In the summer of 1998, Starr Sullivan was offered the job of Plant Superintendent. The following September Missoula Public Works Director Bruce Bender had to meet with plant staff to discuss Sullivan's promotion. The selection process had created controversy when a more experienced external candidate was passed over in favor of Sullivan. Director Bender told plant staff that he had rejected the candidate, Joanie Emrick, because she was "narrow minded." Employees understood what this code word meant: Emrick was snubbed because she had a reputation for vigorously following the law and reporting violations, and had refused to cook data to boost the Department's reputation.

During the meeting Director Bender defended his selection, stating that there had not been any reported violations with Starr at the helm. When a plant operator challenged Bender, stating that there had been many bypasses, but that Starr simply refused to report them, Bender responded by calling Starr's violations a "state thing" that "has nothing to do with the Federal Government."

This attitude from upper plant management and the Department of Public Works is nothing new in Missoula. As far back as June, 1987, the city was found to not be reporting permit violations to the state Department of Water Quality. Then-Mayor Bob Lovegrove wrote a memo charging "once again the city of Missoula is 'caught' by the State of Montana for violating the terms of its MPDES permit." The memo blames negligence and mismanagement of plant operations for the lack of citizen support for bond issues and tax increases.

IV. Backflow in Motion

Wastewater treatment plants must take great care to protect their own drinking water supply. The close proximity between potable water and fecal matter can present risks. Wastewater contains a variety of pathogens, including E. coli, streptococcus, salmonella, shigella, mycobacteria, pseudomonas aeroginosa, giardia lamblia, tacnia, ascaris and hookworm ova.

E. coli is a species of fecal coliform that has been blamed for major public health emergencies in recent years. E. coli commonly causes violent stomach problems similar to food poisoning, but it can also be fatal, particulary for children, the elderly, and people with weakened immune systems. For example, in the Spring of 2000 an E. coli outbreak in Walkerton, Ontario contributed to the deaths of at least 12 people.

"Backflow" is the term that describes the contamination of drinking water by non-potable water or substances (i.e., sewage). To prevent contamination and possible disease, treatment facilities commonly use backflow prevention devices.

Improper Equipment

A variety of backflow preventers exist on the market. However, the Uniform Plumbing Code adopted by the City of Missoula only allows a particular type of backflow preventer, known as an Air Gap Tank. Air Gap Tanks are the minimum requirement for all other plumbing codes as well.

In 1997, The plant's Air Gap Tank broke down, and was replaced with a cheaper device, called a Reduced Pressure (RP) assembly. RP devices are less safe than an air gap preventer, and the Uniform Plumbing Codes specifically forbids their use around substances defined as lethal hazards, including radioactive waste or sewage.

Soon after the RP device was installed, a plant operator notified Operations Chief Starr Sullivan of the violation and the associated health hazards. Sullivan told the operator that the illegal RP would be used anyway. State law, however, mandates that a licensed tester must write up a test permit before the device may be put into use. Because qualified plant operators simply refused to falsely permit an unsafe and illegal piece of equipment, the RP was used for years without a permit.

According to plant staff, Sullivan summoned the operator to his office and demanded that he falsify a test permit for the RP. Although the operator refused, Sullivan eventually convinced an external contractor to certify the unsafe backflow prevention device. One year later, Sullivan forbade the operator who refused to violate the law from attending a recertification course to maintain his license.

V. STEPping in It

Homes in Missoula traditionally had one of two types of sewage treatment— septic tanks or gravity lines. Septic systems allow bacteria to break down waste matter in individual underground storage tanks. Gravity lines, on the other hand transport waste to the Wastewater Plant for treatment and re-release. Although Missoula has had a gravity system for nearly a century, approximately half of its citizens continue to rely on septic tanks. When septic tanks break down or back up, they can be difficult to repair, and the resulting sludge swamps can become a public nuisance. Most municipalities have tried to switch homeowners over to city-run gravity lines. When properly maintained, gravity systems provide cleaner, safer and more convenient plumbing.

An Outdated System

Missoula's gravity system dates back to 1910. Depending on when they were laid, the lines are made of materials ranging from wood, clay, and iron to concrete and PVC pipe. For most of this century, maintenance crews had no proactive method to test the structure of the sewer lines. They simply waited until a homeowner reported a backup before they cleared the lines with old fashioned but effective metal rodders. In the late 1960s, the city began using high pressure water hoses to flush out obstructed lines. The water jets were moderately effective in detecting cracked and broken lines by flushing out abnormal amounts of dirt and gravel or root clumps from nearby foliage, but the system was still set up to locate and repair, rather than prevent, leaks.

In 1992 an engineering firm requested that the line maintenance crew begin keeping a detailed list of damaged lines, so that repairs could be made, but as of September 2000, the list was still not finalized. After a short period of interest by city engineering, the line maintenance crew gave up compiling the list as it became apparent that the city was ignoring their recommendations.

The STEP Fiasco

Instead of modernizing the entire gravity line system, the city of Missoula introduced a Sewage Treatment Effluent Pumping (STEP) system in 1992. Cheaper than switching every septic tank user over to a full-fledged sewage network, the STEP system was hailed as a compromise between the two systems. According to the city's brochures:

STEP systems utilize a new leak-proof septic tank which is installed in each homeowner's yard. The discharge from these new septic tanks is pumped through small diameter pipes to the wastewater treatment plants, where it is treated. Utilization of STEP system technology has allowed for expansion of the wastewater collection system while minimizing costs and disruption of established neighborhoods.

So far, the system has failed to live up to its intended purpose, due primarily to poor maintenance from the Department of Public Works. By 1994 the employees had seen enough faulty equipment, partisan bickering, and disputes with contractors to last a lifetime. In the eight years since the program's inception, treatment plant staff have recorded more than 2000 repair calls on approximately 1400 units. Thousands of staff hours have also been spent on the "improved" version of community tanks. Negligent record keeping, however, has prevented much of this service work from showing up the incident log.

Unlike with gravity collection systems, the city has developed no method of monitoring the integrity of the charged mains conducting water for STEP systems. Once again, city workers are made aware of a problem only when a leak is detected. And the leaks have been the source of countless horror stories:

- House foundations sink into the ground.
- Sewage flows out of hillsides and into residents' yards.

- Sink holes commonly appear in yards, creating swamps of raw sewage.

A heavily-loaded truck actually fell through asphalt after the dirt underneath had been washed out from a system failure.

Of the three mechanics assigned to the treatment plant, two are now required to spend the workday checking STEP systems and responding to urgent calls for repairs, leaving only one to do the work of three people at the plant itself.

Gravity collection systems can also be faulty, but with the money the city is spending to maintain the STEP systems, Missoula could provide top of the line gravity sewage service for every home. Pubic Works Director Bruce Bender claims that each STEP site costs the city about five cents per day, or about $18 each year, but in truth the city spends approximately $90 in service labor alone on each of the 1400 sites each year, or a minimum of $130,000 annually. When the mounting costs of maintenance and repairs are factored in, they already exceed $2 million.

According to tracking logs, STEP systems are 800 times more likely to cause residential backups in the Missoula area than gravity service. They are likely to result in service problems as much as 2000 times more frequently than gravity connections. Employees contend that these problems would not be nearly so bad if the city would perform basic annual maintenance on the systems.

A Bogus Report

After the first two years of watching these systems fail, employees called for a moratorium on STEP systems altogether. Public Works Director Bruce Bender commissioned a major local engineering firm, WGM Inc., to come up with a report that would decide whether Missoula should continue to install and use STEP systems. WGM is no neutral third party. Indeed, they received the commission soon after completing a 900 STEP unit installation at the city's Wapikya/Belleview subdivisions. Not surprisingly, the report concluded that STEP systems should continue. The report came up other with findings that infuriated the city's waste treatment and health professionals:

It found a mere 2% failure rate of STEP systems. To come to this conclusion, the commission only examined screens. Systems with broken lines, bad floats, busted valves, cracked fittings, sink holes, repeating alarms, broken lids, water-filled wiring boxes, burned fuses, or damaged pumps were not considered faulty. It also ignored the fact that the blamed screens were simply not being properly maintained.

The report draws ridiculous "positive" conclusions, even noting that communities that do not use Orenco brand equipment have never reported Orenco equipment breakdowns.

The report frequently blames homeowners and users for equipment failure, although they have no role in the installation or maintenance of this equipment.

The report did back up one thing that plant employees had been saying all along. It admonished the city no less than three times for failing to perform annual maintenance in accordance with the manufacturer's instructions.

In 1998, Director Bender claimed in the Missoulian that the city would soon discontinue the use of STEP systems. To date, this has not been actualized — several hundred new systems have been "dry laid" for future connection to city sewer.

Plant employees are not surprised. The city's Supervisor of Collections, Pat Brook, is also the lead man representing the STEP system installers. Thus, despite the public pledge to discontinue the system, new STEP systems continue to be installed every day.

VI. Tales of Sludge

Sludge is the byproduct of settle-able solids in water. In wastewater treatment, sludge consists largely of fecal matter, and contains extremely high concentrations of pathogenic organisms.

Groundwater Contamination

In the late 1990s sludge transfer problems were common at the Missoula plant. The primary digester would often clog, resulting in sludge overflowing down the "driveways," into nearby injection wells, and straight into the aquifer.

One particularly nasty backup occurred on October 18, 1998. Operators were unable to stop the overflow, and Starr Sullivan was called in to the plant to address the emergency. Rather than fixing the overflow, Sullivan simply ordered operators to transfer some sludge to a holding tank and leave it running over night.

The next morning plant workers showed up to a parking lot covered with overflowing sludge. In some places, the sludge was more than a foot deep. The contaminated driveway, which the plant shares with the neighboring dog pound, was not blocked off from public use. Sullivan ordered that operators do nothing as cars drove through the sludge, which was at times higher than the bottom of the car doors. According to log entries, Sullivan finally allowed staff to stop the overflow at 12:30 that afternoon, and the sludge was redirected to drying beds through a different path. Log books indicate that this was only one of at least six overflows that contaminated the aquifer in October 1998.

When a similar overflow occurred on November 3 that year, the three responsible operators initially on the scene decided not to handle it the way Sullivan did. Instead of directing the sludge to flow directly into the injection wells (and subsequently, the groundwater), they instead transferred the overflow into drying beds. Next, they notified the County Dog Pound, which shares the driveway with the wastewater plant, of the health hazard and warned employees not to drive though it. The woman on the phone replied, "we have figured that out by now." The operators then coned off the area to warn of the hazard.

When the line maintenance supervisor arrived at 7:30 that morning, he instructed the operators to follow Sullivan's example and let the sludge run into the injection wells. The operators, with a combined 50 years of licensed experience, challenged the Line Maintenance supervisor, who was not a licensed operator. One operator stated that they would only redirect the sludge into the groundwater under order, which the supervisor refused to do. Instead, the supervisor walked away, later instructing the other two operators again to stop the transfer. Later that day Sullivan verbally reprimanded the dissident operator for questioning his un-licensed supervisor.

The incident was reported to The Missoulian anonymously that afternoon, and the newspaper ran a story the following day. The article quotes Sullivan making a number of misstatements about the spill. He blamed the incident on "an operator," but neglected to mention that he was the operator. He also told the newspaper that the contaminants were "not hazardous," going so far as to compare the foamy sludge to meringue. The newspaper reported that it was only the second such incident that month. Spin control notwithstanding, an angry Sullivan later chastised his staff for the media leak.

Months later, a concerned operator asked the lab to run a coliform test on the contaminated injection well. When the lab sent back results of two concentration samples, the first found 100 colonies of coliform per 100 milliliters. This is ominous, as a healthy ground water supply is expected to have no evidence of coliform bacteria at all. The lab marked

Upset sewer plant gets calming bromide

By SHERRY DEVLIN
of the Missoulian

Workers gave Missoula's sewer plant a 2,500-pound Tums on Tuesday, hoping to settle a digestive upset that sent foaming sludge spilling out of a treatment box and onto the ground.

Starr Sullivan, superintendent of the city's waste-water division, said the foam was produced by an out-of-balance anaerobic digester and was not a health hazard. Workers quickly vacuumed the sludge into a tanker truck and pumped it into drying beds.

It was the second such upset in as many weeks at the waste-water treatment plant just off Reserve Street along the Clark Fork River.

Sullivan said the problem started when an operator opened the wrong valve on the digester that treats solids before they are dewatered.

"It's a biological process," he explained. "When it gets out of balance, one type of microbe begins to produce a lot of carbon dioxide, which produces foam – like the foam on beer."

So upset was the system that the foam spilled out of a treatment box and onto the ground. Nothing went into the river or outside the boundaries of the treatment plant, Sullivan said. The foam, he said, was almost like meringue. "It just stood there."

The spill was not hazardous, he said. "It was compost basically – treated bio-solids."

Tuesday's incident was a continuation of the earlier problem, according to Sullivan. "You have to look at this as a living organism," he said. "It takes awhile to get better, and last night it took a downturn."

Every fall when the temperature gets colder, the waste-water plant has trouble keeping its anaerobic digester in balance.

"These are temperature-sensitive organisms," Sullivan said. "The error took a borderline situation and tipped it over the edge. It really started producing carbon dioxide. It was like shaking warm beer."

Sullivan's crew got the system back under control Tuesday by adding 2,500 pounds of hydrated lime – "a big huge Tums" – to bind with the carbon dioxide.

"The lime buffers the carbon dioxide," he said. "The system still hasn't fully recovered yet, but it's under control."

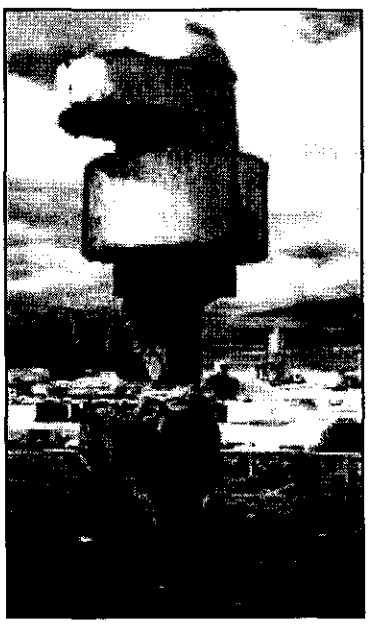
Obscured Facts: The *Missoulian* article from November 4, 1998.

the second concentration "TNTC" - meaning the colonies were Too Numerous To Count.

While the incidents in November 1998 were dramatic, plant employees maintain that smaller sludge accidents continue to regularly occur.

Methane Leaks

The Missoula Treatment Plant's gas management system was originally designed to utilize methane gas, a byproduct of sludge, as a fuel to operate plant equipment. Due to poor management and a lack of maintenance the hundreds of thousands of dollars invested in this system has been a waste of taxpayers' money. Throughout the past decade, methane blowers have not been used, and most of the gas management system has been isolated due to unrepaired leaks. These problems have pushed the original engineered systems out of balance, and the system continues to discharge unburned gas to the atmosphere from the emergency relief valves. This creates a major air quality problem, as well as serious health and safety issue. Methane gas creates a risk of explosion, which would endanger employees and the public. DEQ has never inspected the hazardous leak.



A Gas Problem: The malfunctioning emergency relief valve.

The discharging methane has rotted out the systems piping, and it is likely that the internal flame arrester is similarly corroded, although it hasn't been checked in years. Manage-ment's policy has been to ignore the issue, and administrators have hostilely refused employees recommendations to resolve the problem. The complacency toward the hazard is apparent in the official forms that operators check off when they make their rounds. Instead of asking whether there is a leak at all, Sullivan has asked operators to record whether the emergency relief valve is leaking, fluttering, or fully open on daily rounds forms.

CITY OF MISSOULA WASTEWATER TREATMENT FACILITY

PROCEDURE I.2.a.1.

CHLORINE RESIDUAL SAMPLING

NOTE: Chlorine residuals exceeding permit limit is probably the most common and easiest permit violation we now can have at this facility. This being the case, a great deal of care must be used in obtaining samples for chlorine residual testing.

Testing for a chlorine residual is an operational control as it is the basis for making process control adjustments to the chlorination equipment. Daily monitoring and adjustments to the chlorination equipment to meet the permit requirements should normally be done by the plant operational staff.

The following guidelines will be used to obtain a chlorine residual and to avoid unnecessary exceedances of the discharge permit.

1. Only one EPA approved test will be conducted daily using the spectrophotometer and or titration method.

2. The sample will only be taken between the hours of 10:00 a.m. and 6:00 p.m. to avoid sampling during low flows.

3. The chlorine residual will be checked each time with the DPD colormetric wheel before using an EPA approved test. If it appears that the residual is near or above the permit level, the operator shall turn the chlorinator down and wait at least 1 hour before sampling again.

4. The residual will be checked against the permit limit and the most recent fecal coliform results before adjusting the chlorinator. The chlorine residual should be kept as low as possible, but maintain a sufficient coliform kill to meet permit requirements. NOTE: When doing this, it is important to keep in mind that the permit limit for coliforms is a geometric mean for 7 and 30 day periods. The permit limit for chlorine residual is a one event violation.

The permit limits for chlorine residual and fecal coliforms are as follows:

Total residual chlorine shall not exceed 0.37 mg/l.

	30 day avg.	7 day avg.
Fecal coliform bacteria:	10,400 org./100ml	20,000 org./100ml

Chlorine Sampling Guidelines from September, 1993. Step 3 directs workers to ignore samples that are in violation and "wait at least 1 hour before sampling again."

VII. Out of Control

Chlorination Testing Shell Game

Chlorination plays a critical role in the wastewater treatment process by destroying pathogens and other physical and chemical impurities. The Missoula plant has greatly changed it's chlorination procedures in recent years. In 1977, the NPDES permit allowed the plant to use .5 milligrams of chlorine per liter of water, and the chlorine was used all year round to disinfect fecal coliform. The permit limited allowable coliform bacteria levels to 200 colonies per 100 milliliters each month.

In 1982, the NPDES actually lowered the amount of chlorine allowed — down to .37mg/l. Further, chlorine treatments were only allowed in summer months, June through September. Frighteningly, coliform limits were increased to 10,400 colonies per 100 ml on average each month, or 20,800 colonies per 100 ml on average each week. In other words, the new permit allows for a 5,200% increase in fecal coliform. Compared to other states, the allowable bacteria levels were extremely high.

Until the early 1990's, chlorine measurements at the Missoula plant were taken using processes based on sound science and officially approved by EPA. In 1993, Starr Sullivan ordered that a new method be implemented to measure both chlorine and coliform levels, a method developed by Sullivan himself without the guidance of state or federal authorities. The new procedure discourages operators from reporting violations of chlorine or coliform levels; instead, they are directed to adjust contaminant levels until they are in compliance. Sullivan's written guidelines, handed out in a September 21, 1993 meeting are very clear of the motive behind the new method— to cook the books so that the plant would never be found in violation.

Frequent chlorine distribution failures have resulted in dramatically inconsistent coliform counts, which the facility managers are expected to manipulate by controlling the test periods. Samples are being manipulated by the monthly laboratory data report and coliform data sheet. The chlorine samples are normally taken in the morning — whenever the sheet reports that they are taken later in the day, it indicates that the morning sample was found in violation, and an adjustment needed to be made to pass the test. In some cases, data sheets indicate that the sample was taken after 5:30 pm— well past the lab's staff normal work hours.

Uncertain Certification

Plant managers do not stop at fudging data numbers— they appear to be unconcerned with common sense safety regulations as well. The plant frequently operates without licensed operators and supervisors in charge, and managers are clandestinely inconsistent with state certification requirements.

For example, when Gene Connell was promoted to the job of treatment supervisor, he was using an operator's license that had been expired for years. By state standards, he was ineligible for the job, yet it was handed to him rather than to experienced, lawfully licensed operators, likely due to Connell's previous statements of his willingness to falsify records and ensure clean findings.

Plant managers also helped falsify the state application for Plant Operator certification for a laboratory technician in 1992. Although she had never worked as an Operator-in-Training, Sherri Kenyon received her Operator's license and was eventually promoted above her former supervisor.

The state certification process requires that operators obtain continuing education credits to keep their

Quicksilver Madness

An incident in November 1997 had plant employees seriously questioning their supervisors' commitment to worker safety. One of the manometers used to measure the water flow into the flotation system began to leak mercury onto the basement floor. Superintendent Sullivan was notified but hadn't acted to clean up the toxic mess by mid afternoon. By that point the puddle of mercury had grown more than six times in size—approximately 16 square feet—and was heading toward the sump pump. When staff again complained about the hazard, Sullivan testily marched downstairs, swept the mercury up with a broom and dustpan, and dumped it into a garbage can. The mercury was later transported to a local landfill along with approximately 400 faulty mercury float switches from the STEP systems over the years. A laboratory technician ordered a mercury clean up kit, but the plant basement wasn't properly decontaminated or completely cleaned up until the kit arrived weeks later.

MISSOULA WASTEWATER TREATMENT FACILITY
MONTHLY LABORATORY DATA REPORT
MONTH SEPT YEAR 1994

Date	Cl2 Residual (mg/L)	Time	Location	Analyst	Comments
1	0.13	0850	#3 Cl2 Tank	GM	
2	0.04	0900	" "	"	
3	0.05	0815	" "	GM	
4	0.09	0900	" "	"	
5	0.01	0815	" "	"	
6	0.04	0815	" "	"	
7	0.05	0850	" "	GM	
8	0.04	0850	" "	GM	
9	0.04	0850	" "	GM	
10	0.04	1440	" "	GM	
11	0.03	0800	" "	"	
12	0.02	0845	" "	"	
13	0.12	0810	#1 " "	GM	
14	0.03	0920	" "	GM	
15	0.06	0830	" "	GM	
16	0.04	0820	" "	GM	
17	0.03	0940	" "	GM	
18	0.10	0935	" "	"	
19	0.01	0930	" "	"	
20	0.03	0930	" "	GM	
21	0.03	0900	" "	GM	
22	0.02	0845	" "	"	
23	0.05	0920	" "	GM	
24	0.04	0920	" "	GM	
25	0.04	0830	" "	"	
26	0.01	0900	" "	"	
27	0.03	0830	" "	GM	
28	0.08	0920	" "	GM	
29	0.04	0920	" "	GM	
30	0.03	0900	" "	GM	
31					

Cooked Books: This data sheet indicates that samples are taken at random times of day.

licenses current. While this could be a positive requirement to ensure that operators keep up with the latest in science and technology, Missoula plant managers often use mandatory classes as a weapon against operators with whom they have political and personal differences. Two of the plant's most senior operators were not allowed to attend necessary classes, and they lost their state certification. In most cases, decertified operators are still required to perform their original job duties, but this means that the plant is running illegally, without properly licensed operators in charge.

Certifications are more than just a technicality. Proper training is crucial to the health and safety of plant operators. Inexplicably, Missoula plant management refuses to allow operators who are required to operate plant boilers to attend the proper courses and obtain state certification, even though operating a boiler without a license is a misdemeanor in Montana. As far back as July 21, 1992, log book entries indicate that Gene Connell, a non-certified boiler operator, was illegally repairing parts on plant boilers.

Reality of Retaliation

Keep your mouth shut or you will lose your reputation and your job.

One reason many of the stories detailed in this paper have not been made public earlier is the ever-present fear of retaliation against employees who speak out. We've already heard about employees denied the training classes needed to keep their certifications to do their jobs, but other forms of retaliation also permeate life at the wastewater treatment plant.

In October, 1990, a plant operator named Vern Carlson sent a memo to managers addressing unsafe work conditions in the plant. Within a year, Carlson himself was accused of a major safety violation: someone had left a methane water drain valve open which could have potentially caused an explosion. Plant managers blamed Carlson, and he was immediately terminated. Many employees believe that Carlson was framed for bringing unwanted attention to plant safety hazards. Even if the mistake had, indeed, been Carlson's responsibility, employees contend that the punishment was out of scale for the violation. Employees witnessed both Starr Sullivan and Gene Connell commit the same offense in the years after Carlson's termination. A log book entry from February 7, 1996, the morning after Sullivan was on duty, backs up this claim:

"10:00 Rounds and equipment check lead equipment switch over. Found DAF sludge transfer pump oilers completely empty, Digester Gas water trap drain valve left open, Raw sludge pump #2 still plugged and rags in grit truck piled up all the way to the conveyer belt #1 primary has 1.5' sludge blanket but pump is still working." (Emphasis Added)

Stories like these send a message to all employees—keep your mouth shut or you will lose your reputation and your job.

Hazardous Waste Collection Daze

Aside from the bio-hazards associated with fecal matter and organic waste in the raw sewage, toxic chemicals provide an additional threat to Missoula's groundwater. For example, the treatment plant is not equipped to counteract the effects of household and industrial chemicals.

Despite the threats, the Missoula plant hosts an annual event, known as Hazardous Waste Collection Days, in which thousands of citizens drop off their hazardous chemicals, paints and oil to be disposed of by the city and county. The oil is barreled up and sent off to a local oil recycling company. Treatment Supervisor Gene Connell takes the left over chemical waste, including acids, pesticides and numerous other unaccounted-for chemicals and dumps them into the headworks of the treatment plant. The types and amounts of chemicals are never recorded.

Recently the plant has begun accepting 275-gallon containers of expired sodium hypo chloride from the city's chlorine vendor for disposal. The containers are emptied into the treatment facility in one day. The normal daily chlorine limit for disinfection is approximately 30 gallons per day, so each barrel represents more than nine times the normal daily chorine usage.

VIII. Where Do We Go from Here?

It is one thing to raise problems and quite another to solve them. The solutions to the problems raised in this white paper are simple, direct and inexpensive.

By contrast, the costs of continuing the status quo are potentially quite large and include a growing risk to the safety of our drinking water, an increasing threat to the "fishablity" and "swimmability" of the Clark Fork River, growing contamination of our ground water and an expanding array of pollution, fiscal and even personnel problems emanating from the Missoula Department of Public Works.

Apart from the cost-benefits, these seven recommended steps should be implemented simply because they are the right things to do:

- **Investigation.** The Missoula City Council should immediately retain an experienced outside investigator to verify patterns of malfeasance and employee harassment over the past decade.

- **Oversight.** Montana Department of Environmental Quality (DEQ) should assign a statewide task force to assess permit compliance at all municipal wastewater treatment plants in the state. DEQ should exercise its authority and fine any plants not following the law.

- **Monitoring.** Montana DEQ should randomly inspect fecal coliform levels in the Clark Fork River at least four times a year using accepted water quality scientific ambient monitoring procedures to determine possible health impacts.

- **Methane Abatement.** The Missoula Wastewater Treatment Plant should adopt a methane abatement plan.

- **STEP Moratorium.** Missoula Department of Public Works should immediately place a moratorium on new STEP facilities until the problems with the system have been independently assessed and the City of Missoula, after a public debate, decides how it should proceed.

- **Worker Protection.** The City of Missoula and the Department of Public Works should adopt a non-retaliation policy for whistleblowers who expose violations of law, waste, fraud or abuse in the workplace.

- **Accountability.** Any Missoula plant managers found to have been a participant in public health and safety violations, and/or subsequent cover ups, should be appropriately disciplined.

For too long, the Missoula Wastewater Treatment Plant and its problems have been placed "out of sight and out of mind" by our local elected officials and state environmental agency. For both protection of public health and peace of mind it is time for these folks to start paying attention.