

The Brockton Planning Board held a meeting on October 7, 2015 at 7:00 PM in the GAR Room, City Hall. Members present: Chair David Wheeler, Ross Messina, Gary Keith, Andrea Burton, Reggie Thomas and Ollie Spears. Also present were Pamela Gurley Planning Board secretary, Staff Planner Shane O'Brien and City Solicitor Philip Nessralla.

1. Lot Releases, Plan Endorsement, Minutes

2. Site Plan Approval – Continued from September 16, 2015

Applicant: Brockton Power Company LLC

Property: Plots 3 & 4 Industrial Blvd.

Representative: JK Holmgren Engineering

Attorney Nessralla explained the parameters that the Planning Board has to follow in order to grant a permit for site plan approval. He said the Ordinance sets out narrow parameters under which a determination is made. He said that City Ordinance limits the criteria under Sec 27-89 and reminded the Board not to delve into areas that have been decided by the courts and the EFSB.

Attorney Barry Fogel introduced the following team members:

John Holmgren

Scott Faria

Jon Winslow

Zachary Gordon

Arnold Wallenstein

Andrew Degon

Attorney Fogel said that they appeared before technical review committee and have incorporated their recommendations and suggestions into the information before the Board tonight. He said that the application addresses all filing parameters and there was some "fine tuning" of the plans to address some of the peer review comments and believes that the Board has all the information necessary and the project meets the criteria for approval.

Scott Faria gave a brief overview of the site and noted the primary access and secondary accesses on the plan and said the secondary access will have a breakaway gate. He said there will be a new 12" water main installed. Attorney Fogel pointed out that Industrial Blvd. is not paved through and that as part of this project the road will be paved through and they will continue the existing drainage system and the existing piping will be connected to their system.

Ms. Burton said that currently the drainage is uncontrolled and that this new system will control it.

Shaun Martin said he reviewed the site design, stormwater management, landscaping, traffic, supporting infrastructure and said that the nature of a lot of the comments are

minor and can be addressed. He said the stormwater management is a conservative design and said a lot of site will be restored to a more vegetated site.

He said that his report to the Board contained the some of the following recommendations: Relocation of the valve system in the outfall pipes to stormwater system should be relocated from the inside; although access was addressed pedestrian routes were not; security fencing was not apparent on the west side; security lighting and access comments; the site will be secure and they need to make arrangements for employee access. A primary concern is pre construction traffic; peak hours will be a little before peak traffic and the applicant should submit a traffic management plan which may need to include temporary signalization; all construction materials and parking must be on site; there should be no parking to be allowed on the public street. Landscaping exceeds the requirement; however he made some recommendation on type of species. The sizing of pipes to convey wastewater to and from the plant is adequate; there is no lighting plan and the Board should evaluate possible offsite projection of lighting and there are no building drawings. If wastewater is unavailable will potable water be available so that the plant does not overheat. Attorney Fogel said that the EFSB has ruled that there is to be no use of municipal water for makeup; if the connection is down the plant will not operate; he said there is no redundancy.

Mr. Faria said that the access gate will be secure will slide gate to provide additional access. They will eliminate rhododendrons and use a smaller low lying plant and will not use roses. The handicapped spaces will be addressed and they will increase the sidewalk to provide better handicapped access. Security fencing will surround all four sides of the property along the DEP limit of work area. He said eight hydrants surround the site and they will work with the Fire Department regarding their final locations.

Mr. Wheeler asked Attorney Fogel if there was anything in the memorandum that they would take issue with and Attorney Fogel said no and they will work to address all the comments.

Mr. Wheeler opened the hearing for public comment. He said that each person speaking would be given two minutes to make their statement.

In favor:

David Fenton said he was here representing the Construction workers union and wanted to be recorded in favor.

Opposed:

John Drusinskus said he is opposed and said he is not convinced it is environmental safe; he asked if the energy would be going to the citizens of Brockton and if the employees would be residents of Brockton.

Bishop Texeira passed out a written statement (attached).

Barbara Carchidi said she believes that this hearing is pre-mature; she said she would like to see an impact study and believes that they need a variance for the towers; she said no one has addressed the impact on the drawdown to the river.

Jeanne Holmes said she is opposed to the plant. She said she has filed two open meeting complaints against the Board and because of that felt this hearing should not go forward as any decision that comes from these meetings is tainted in her opinion. She said she will be filing another open meeting violation relative to this meeting. She said the hearing should have been held in a larger room...that there are people are standing in the hall.

Councillor Moises Rodrigues said to go forward with this hearing is unfair to the city. He would like to see this postponed as there are too many outstanding issues. This project brings only 10 jobs. He asked the Board to look around the room, and said the people here tonight are not representative of Brockton.

Lucia Cerci from the Boys and Girls Club said Brockton is being preyed upon because of their high level of minorities; she said they have also not addressed air quality.

Carl Penton asked what as in the tanks showing on the plans and what will be in the water that will be released to the air. Attorney Fogel said that the seven tanks showing are cooling towers.

Jim Bosco said he was a current member of the Conservation Commission, but was not a member when this went through the Commission. He asked which members were able to vote and Mr. Wheeler said that all the members are able to vote.

Mr. Bosco asked if the current plans are different from the originals presented to the Commission and asked if they need to return to the Commission. Attorney Nessralla said that there is a superseding order from DEP. Mr. Bosco asked if there were any chemical storage tanks and if so what type and if there is a spill containment plan.

Councillor Robert Sullivan said he felt the Board should postpone their vote tonight. He said that the consultant has brought up clear issues that need to be addressed. He also submitted for the record a copy of the City Ordinance regulating the sale of wastewater by the City Council (see attached).

Kate Archard said she was a member of the water Commission and said it was within the power of the Board to table the hearing for further information. She said she does not know what special conditions would be needed for the use of re-claimed water; she said she has not seen any easement for the sewer effluent; she asked who was responsible if the pipe breaks.

Laurie Watson said she came tonight for information and said after listening she cannot support something that meets "minimum requirements".

Jacob Tagger yielded his time back to Jim Bosco who asked if the Board thought that that the hearing will be continued. He said that the Board needs to ask the relevant questions and said not one question had been asked by the Board. Mr. Thomas asked him what he would like to have addressed.

Laurie Mathews said no one answered the question regarding what chemicals will be stored. She said that they will have a 15,000 gallon ammonia tank that is so volatile that police will need to be called during deliveries. She said there is an Elementary School within 60 feet of facility (submitted a study for the record).

Councillor Shaynah Barnes asked about the possible open meeting violations and asked Attorney Nessralla for his opinion as to whether Board can proceed. Attorney Nessralla said that the meeting can proceed and that the Law Department is addressing the concerns. Mr. Wheeler said he has re-viewed the open meeting law and feels that the Board is in compliance.

Susan Martelli asked what the benefit to the city would be.

Councillor Michelle Dubois said she just attended three days of hearings at DEP. She said the citizens group filed an appeal and the decision will not be made until February. She said it is possible that the permit may be overturned. She said she has filed three bills in the Statehouse relative to power plants. She said it has already been seven years and felt that the Board should wait for the DEP decision and said they should want to make sure this is done right.

Councillor Paul Studenski said this project is putting us all in danger.

Mark Swinimer asked to be recorded in favor. Mr. Wheeler said that those in favor spoke earlier, but that he would be recorded in favor.

Public portion was closed.

Mr. Keith asked what chemicals will be stored on site and safeguards Brockton Power is proposing. He asked them to address the issue of trucks going through neighborhoods.

Attorney Fogel want to correct the statement from Councillor Dubois and said that DEP does not have the authority to remand this back to the ESB. Regarding the chemical's he said all the information has been on file with the planning board and asked that a member of his team address that question.

The Board was told that ammonia is a standard material and chlorine is used to purify the water. Regarding the SWPP plan, they were told that is a requirement and will be filed with the state. The Board was told that the plants are designed with safeguards.

Mr. Thomas asked Mr. Martin if the lack of calculations for the water shed around the pipe is issue. Mr. Martin said it may or may not be an issue depending on what he

sees. Mr. Faria said that the maps were done, but was obviously left out of the information provided. He said they will provide the information. Attorney Fogel said that the stormwater plan has been reviewed and approved. Mr. Thomas said that he is concerned that the plans are incomplete. He said the Board is being asked to make a lot of assumptions.

Mr. Martin said that the SWPP plan is EPA regulated, but he is unaware if there is a spill prevention plan. If there is it should be made available to the Board.

Mr. Spears asked about the missing in the lighting and building plans and Mr. Martin said there were no building elevations or lighting plans submitted. He said these need to be reviewed to make sure there is no lighting cast off from the site.

Mr. Wheeler said that regarding the question of a height variance he has been the chimney is exempt under zoning. He said that regarding health impacts, although those are under the purview of DEP, he asked that the applicant address it briefly so that that public would have access to it. In regard to the aesthetics, he said he would like to see a more sophisticated diagram. Attorney Fogel said they would provide the drawing.

Mr. Messina asked if the air permit address the concerns of the residents. Attorney Fogel said DEP standards for pollutants are taken into account as with any project that might add to the national ambient air quality standard. He said DEP- Lakeville has issued an approval, and the hearing last week was a challenge to that permit.

Mr. Spears made a motion to continue the hearing in order to receive the DEP paperwork, lighting and elevation plans.

On the motion: Mr. Thomas suggested that the motion be amended to include all DEP paperwork addressing the air quality, the lighting plan, elevations of building, detailed chemical list of stored and transported chemicals and detailed route as well as the watershed information and SWPP plan and that the applicant address the Fuss & O'Neil memorandum.

Ms. Burton said from a construction standpoint, plans are fluid.

Seconded by Mr. Keith

In favor: Wheeler, Keith, Spears and Thomas
Opposed: Burton and Messina

Attorney Fogel said they would provide the DEP air quality information summary and said that the SWPP plan and spill prevention plan will be developed as the project is designed. He asked if the Board was comfortable with Fuss & O'Neil and JK Holmgren meeting to work on the outstanding material to come to an agreement. He was told that the members had no issue with the engineers working together.

Attorney Fogel said that they would need about two weeks to get the information to Mr. Martin and Mr. Martin said that he would then need time to review the additional information.

Mr. Spears made a motion to continue the hearing to 12-1-2015; general business at 5:30 PM and continuation of the site review hearing for Brockton Power at 7:00 PM. Seconded by Mr. Messing and unanimously passed.

Meeting adjourned.

My name is Bishop Teixeira, OFSJC: Diocesan Bishop of the Diocese of St. Francis of Assisi:

Brockton Power is being given special treatment by being allowed at this hearing tonight.

Mayor Bill Carpenter has entered into an unlawful agreement with this company and they are suing the good residents of Brockton.

The members of my church that are Brockton residents and own small businesses would never be able to appear before this board with incomplete plans and an agreement made illegally with the mayor.

Mayor Bill Carpenter is working outside of our form of government to satisfy his campaign donors, do not let him do to this body what he did to the city council.

I want to make it clear, that our City Council has the authority over our wastewater, not Mayor Bill Carpenter and they have not granted that to this company that is suing us, so they have no plan in place for their toxic cooling towers! A wide majority of residents are against this plant. I also understand that there are easements and other issues unsettled, because of this I recommend that you reject these plans tonight.

Thank you very much!

Contact Info:

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In City Council September 24, 2007

ORDINANCE:

An Ordinance Amending Chapter 23 of the Revised Ordinances of the City of Brockton. Be it Ordained by the City Council of the City of Brockton as follows: Chapter 23 of the Revised Ordinances of the City of Brockton is hereby amended, in Article III, Division 1, by inserting the following new section:-

SALE OR USE OF EFFLUENT FROM THE
WASTE WATER TREATMENT FACILITY

Any sale, use, or agreement to provide or transfer the effluent discharge from the Waste Water Treatment facility owned by the City of Brockton shall require approval of the City Council by two-third (2/3) vote of the entire Council.

Councillor Paul F. Studenski

Councillor Thomas G. Brophy

In City Council, September 24, 2007

Read and Referred to Standing
Committee on Ordinance

Anthony J. Zeoli, City Clerk

In City Council, October 22, 2007

Amendment failed by a hand vote.
Councillor Brophy motioned to adopt
a new amendment and was properly
seconded. The new amendment
passed by a hand vote. Passed to a
third reading by a hand vote.

Anthony J. Zeoli, City Clerk

In City Council, November 13, 2007

Ordained by a roll call vote taken by "yeas" and "nays"; eleven members present and all voting in the affirmative. Councillor Studenski motioned to file reconsideration with the wish that it not prevail and was properly seconded. Reconsideration failed by a hand vote.

Anthony J. Zeoli, City Clerk

Approved:

James E. Harrington, Mayor
November 14, 2007

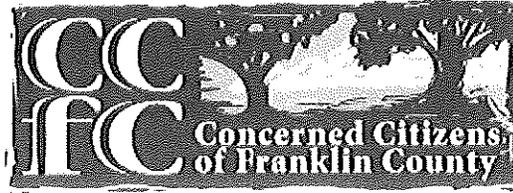
6044

Attest: _____
City Clerk

A TRUE COPY ATTEST

Anthony J. Zeoli

City Clerk



P O Box 653, Greenfield MA 01302
concernedcitizensoffc@gmail.com

The Case Against the Use of Sewage Effluent for Wet-Cooling the Greenfield Incinerator

Introduction:

An essential component of the planned Pioneer Renewable Energy (PRE) incinerator proposed to be located adjacent to the Greenfield Industrial Park is the use of partially treated sewage liquid for wet-cooling during the generation of electricity by steam turbines. Operators of the incinerator plan to “buy” sewage effluent from the City of Greenfield in lieu of paying to discharge the wastes from the operations of the incinerator into the city sewer system. As explained below, the proposal to use inadequately treated sewage water in a manner that will release dangerous contaminants into the ground level air is ill-conceived, inadequately studied, and should not be approved without a thorough analysis and extensive public participation in the decision-making process. The approval process followed by the City has severely limited and disrespected the public at every turn, and as a result, opposition to the incinerator continues to build, lawsuits have been filed, and citizen outrage intensifies. This presentation endeavors to bring several legitimate concerns to the forefront of the discussion so that the Town Council will make an informed decision and properly execute their legal responsibility to protect the public from avoidable harm.

Background:

The Greenfield Water Pollution Control Plant (WPCP) provides only secondary treatment for the wastewater generated by the residents, businesses, and industries that discharge to the sewers in town. Primary treatment consists of grit removal and settling. Secondary biological treatment removes just enough of the gross nutrients (measured as BOD & TSS¹) from the wastewater to allow the sewage effluent to be discharged to a receiving stream.² The Deerfield River is relied upon to complete the treatment of Greenfield’s effluent, mainly through dilution and to a lesser extent by the additional biological processes that occur in a living aqueous ecosystem. Such treatment is often calculated as the Total Maximum Daily Load that the receiving stream or body of water can absorb without measurable impairment and degradation.

Recent scientific studies have shown that secondary sewage effluent is still a highly contaminated solution containing numerous classes of discarded and excreted biologically active chemicals such as active pharmaceuticals ingredients & personal care products (PPCPs),

endocrine disrupting compounds (EDCs), mutagenic cytotoxins, etc.³ The US EPA formed the Endocrine Disruptor Screening and Testing Advisory Committee in 1996 to design a screening and testing program to determine whether any unregulated contaminants behave as EDCs. The EDSTAC final report estimated that there are approximately 87,000 chemicals that should be considered for EDC screening. Many of these chemicals can pass through the traditional sewage treatment process with their concentrations and chemical structures unchanged, or possibly modified in ways that may actually increase their biological activity and subsequent impacts.⁴ Relevant studies indicate that the type of treatment employed by the City of Greenfield has been shown to be incapable of removing many classes of Endocrine Disrupting chemicals. The presence of the Baystate Franklin Medical Center facility which discharges pharmaceuticals, medications, controlled substances, diagnostic aid residues, chemotherapy preparations including highly mutagenic cytotoxins, sanitizers, antibiotics, anti-microbials, synthetic hormones, and other classes of medical wastes, to the Greenfield sewer, makes the treated sewage effluent of special concern and highlights the risk of exposure to this complex mix of biologically active chemicals.⁵

Published studies have shown that modern, more advanced treatment of sewage, unlike that now used at the Greenfield WPCP, such as tertiary treatment using actively controlled processes such as ozone treatment, high-energy ultraviolet radiation, activated carbon adsorption, and reverse osmosis, may be capable of removing or destroying many of these contaminants and thereby reduce their concentrations to below detectable limits.⁶ However, the simple physical and biological treatment system utilized by the Greenfield Water Pollution Control Facility does not have the ability to completely remove these contaminants of concern. In fact, the Operator of the treatment plant does not routinely monitor for any EDC inputs in the raw wastewater discharges to the sewer, or measure the removal rate efficiencies of the WPCP for any EDC indicator classes.

These so-called "emerging contaminants" have been showing up in drinking water supplies because the surface water intakes are downstream from sewage treatment plant outfalls. These contaminants are also being found in groundwater which is probably being contaminated by residential septic systems. Concentrations of PPCPs, EDCs, and other emerging contaminants are known to be much higher in secondary sewage effluent than in finished drinking water. Yet exposure to the levels being detected in drinking water is still of enough concern that policies are being formulated and additional research is being conducted, to better characterize these low levels of exposure. Many scientists and regulators are very concerned about the effects of long-term exposure to these low-level contaminants because of their known biological activity at extremely small concentrations. Scientific studies have documented measurable biological effects from exposures to some hormones and hormone-mimicking compounds at the low parts per trillion range. Numerous studies now indicate that many endocrine disrupting and hormonally active compounds have a non-monotonic dose response profile which means that the normal linear dose response models are not predictive. Toxicologists have found significant biological responses at extremely low doses, especially during critical time periods in fetal development.⁷

No one would propose that sewage effluent should be served as drinking water to the residents of Greenfield, Turners Falls, and Gill. This would be unacceptable from a public health perspective

and most people would not accept drinking direct sewage plant effluent. A much greater concern is raised by the potential for significantly higher levels of exposure to the contaminants known to occur in sewage effluent, especially due to the nature of the proposed aerosol exposure route.

Air-Stripping and Steam-Stripping of Environmental Contaminants

The proposed cooling towers at the Greenfield incinerator are needed to cool and condense the steam that drives the generating turbine. The towers will dissipate heat by evaporating a large quantity of water (>500 gallons per minute) by spraying sewage effluent over columns of fill material, allowing the liquid to trickle down in the packed columns, while air is drawn up through the material by mechanical ventilation fans. The heat is dissipated by allowing the evaporated water to escape to the atmosphere.⁸ This cooling process is very similar to Air-stripping and Steam-stripping, two common treatment methods which are employed to remove environmental pollutants found in contaminated groundwater. Air-stripping⁹ is a process that is used to remove volatile compounds from contaminated water through the use of columns that typically consist of countercurrent flows where a low volume of contaminated water is sprayed over media with large surface area while a high volume of air is introduced from the bottom and flows up over the thin water film, transferring the volatile contaminants from the aqueous to the gaseous phase. Since these stripped compounds are often considered hazardous air pollutants, the exhaust from air-strippers may have to be treated to recover the vapors using activated carbon adsorption or some other form of treatment. Many of the highly-volatile compounds in the Greenfield sewage effluent would be reduced during the biological treatment process at the WPCP which uses large trickling filters that act in a manner similar to air-stripper columns, so volatile organic compounds (VOCs) would not be expected in Greenfield effluent.

Steam-stripping¹⁰ is used to remove compounds that have a lower vapor pressure and a higher aqueous solubility. The higher temperature is more appropriate for compounds that can't be removed with air-stripping due to their lower volatility. Steam-stripping is essentially a form of steam distillation which removes or separates different fractions of steam based on the chemical properties of the components. The Greenfield incinerator, using the inadequately-treated sewage effluent, will function as a hybrid steam-stripper / air-stripper, except that all gaseous and volatilized emissions will be intentionally released directly to the ambient air at an elevation of approximately 35 feet above the ground. This contaminated vaporous mixture will be allowed to drift with the wind, or under still atmospheric conditions will be allowed to build up in the local air space. During daylight hours the emitted compounds may be subject to natural ultraviolet bombardment and photo-transformations (photo-chemical smog). During nighttime emissions the volatilized mixture will be subject to condensation as air temperatures decline and the dew-point is lowered. In both cases, many of the stripped compounds will either be deposited in a fall-out zone or will remain in the ambient air, where the concentrations can build up to higher levels. Unpredictable meteorological conditions could lead to the creation of chemical fogs and precipitates containing concentrated xenobiotic compounds. Human and wildlife exposure would be likely from the inhalation of these nebulized and volatilized contaminants from the sewage effluent, as explained below.¹¹

Exposure- Ingestion versus Inhalation

Many Toxicologists are now proposing that the long-term chronic exposure to hormone-mimicking and endocrine disrupting compounds, even at the extremely low concentrations found in drinking water, represents an unacceptable risk, especially for pregnant woman, fetuses, and other sensitive and vulnerable populations.¹² However, the inhalation exposure risk could be orders of magnitude or greater than ingestion, based on several factors. The relatively small amounts of water that can be ingested in a day (approximately two quarts), combined with the low starting levels of EDC contaminants in finished drinking water, result in a relatively limited exposure.

The inhalation route, through pulmonary absorption, can raise the exposure levels significantly. Many drugs, like asthma inhalers, can directly and rapidly enter the bloodstream when inhaled. The average normal human lung inhales about a half quart of air with each breath. This volume can vary, depending on the individual and activity levels, but the average is assumed for this example. Normal inhalation rates are about 14 breaths per minute. This equates to roughly 1 $\frac{3}{4}$ gallons per minute of inhaled air, or 2,520 gallons of air inhaled per day. Compared with the exposure from a $\frac{1}{2}$ gallon of ingested water, the inhalation exposure route is potentially orders of magnitude greater.

Added to the inhalation exposure equation is the fact that between 690,000 to 900,000 gallons per day (gpd) of contaminated sewage effluent will be heated to high temperatures during the wet-cooling process at the Biomass Incinerator, with an estimated 86% of the sewage liquid volatilized into the low-level ambient air. Since this is an intentional or unavoidable exposure source that will be occurring 24 hours per day, 365 days per year, the cumulative exposure will be significant and on-going. This long-term, chronic exposure raises important questions about the risks associated with this constant barrage of contaminants on the residents of Greenfield and surrounding population centers.

Risks and Unanswered Questions

The following questions concerning the chemical fog that will be produced by the wet-cooling process used at the PRE incinerator were submitted to the City of Greenfield during permit hearings and were entered into the public record, but were never addressed by the town. These same questions were sent to MA DEP, but no reply was ever received.¹³

1. What Pharmaceuticals, Personal Care Products, Endocrine Disrupting Compounds, or other Volatile Organic Compounds will be discharged into the air by the use of reclaimed sewage effluent for wet-cooling at this incinerator?
2. What is the effect on the above compounds from chlorination during the disinfection process?
3. What disinfection products will be produced and what compounds will be discharged to the air during the wet-cooling process employing reclaimed sewage effluent?

4. What is the effect of heating the above compounds (Personal Care Products, Endocrine Disrupting Compounds, other Volatile Organic Compounds, Chlorine disinfection byproducts) to the high temperatures encountered during the wet-cooling process?
5. What is the total amount of these compounds that will be emitted every day by the wet-cooling process, assuming that 555 gpm of reclaimed water will be volatilized or nebulized? What is the expected fall-out zone for these compounds?
6. What are the health impacts to citizens, wildlife, and the environment from the constant discharge of Personal Care Products, Endocrine Disrupting Compounds, other Volatile Organic Compounds, and Chlorine disinfection byproducts to the air from the use of reclaimed sewage effluent for wet-cooling of the biomass incinerator?
7. Are any of the above compounds known to cause or exacerbate any medical conditions such as asthma, chronic obstructive pulmonary disease, heart disease, lung diseases, or other commonly occurring disorders? What are the acute risks associated with inhalation of these compounds?
8. What are the long-term health and other impacts associated with inhalation and exposure to these compounds on vulnerable populations such as pregnant women, babies, the elderly, and persons with chronic diseases or compromised immune systems?
9. What are the synergistic effects that can be expected from exposure to multiple compounds?
10. What are the effects of sunlight and ultra-violet radiation on these compounds and are they subject to photo-reactive modification or synthesis?

Concerned citizens have repeatedly requested public officials to address these concerns at public hearings. Some members of the Town Council even stated in public that they were very concerned and some even claimed that they were scared by the potential for impacts to public health from the inhalation of contaminants in sewage effluent, but in the end, all approvals were given without addressing any of the issues raised by these questions.

Inadequately Treated and Tested Sewage Effluent

At a Greenfield Zoning Board of Appeals (ZBA) hearing on 6/25/09, it was emphasized that the sewage effluent would be treated four times; once at the Greenfield WPCP, then at a new treatment plant adjacent to the incinerator, then again (possibly) before discharge to the sewer system, and finally a fourth time when it returns to the WPCP. Disregarding the fact that the treatment at the WPCP is being counted twice, none of the existing or proposed treatment processes being employed are designed to remove the chemicals and compounds that are of greatest concern, the whole range of toxic PPCPs, EDCs, and extremely dangerous cytotoxins that are dissolved in the sewage effluent and pass through these initial treatment processes. At a public hearing before the Town Council subcommittee on ordinances and regulations, it was explained that recycled sewage effluent has been used for cooling at UMass for the past two

years. It was implied that the use of contaminated sewage effluent for wet-cooling was safe, since it was being done at the UMass campus. However, the sewage effluent used at UMass is first purified by a Reverse-Osmosis filtration process and then the purified liquid is used as boiler make-up water in a Combined Heat and Power (CHP) facility.¹⁴ Boiler make up water has to have a high level of purity. The reclaimed UMass effluent is used for a completely different purpose which has no similarity to the proposed use at the Greenfield incinerator, where inadequately-treated effluent would be boiled off into the ground-level air. At the same subcommittee meeting, the question was raised about testing the Greenfield sewage effluent for endocrine disrupting compounds, but the committee was told that such testing is difficult, expensive, time consuming, and is not done at the Greenfield WPCP. The committee was told that the Greenfield effluent is tested by a better method which employs a sensitive bioassay using Fathead Minnows (*Pimephales promelas*). It was claimed that since all of the minnows survive in the sewage effluent for 96 hours, this proves that the Greenfield effluent is safe for use by the incinerator. What was not explained was that the Fathead Minnow bioassay is a test used to measure gross acute toxicity for fish and is not designed to measure the presence of hormonally active chemicals in the wastewater or the effects of long-term exposure to these compounds. It is the constant exposure to these chemicals, even at extremely low concentrations, that is of concern. The Fathead Minnow test has no relevance to the issue of chronic exposure to PPCPs, EDCs, and other toxic compounds.

After the ZBA approval was given, Greenfield's Mayor convened a taskforce of fact-finding "experts" to review all facets of the proposed incinerator. This effort focused on collecting individual opinions from local "experts". These opinion letters and emails were combined into a 23-page taskforce report, broken down by subject: Traffic, Fuel Supply, Water and Wastewater Issues, Economic Impacts, Site Analysis, and Property Values.¹⁵ The "Property Values" report submitted by William T. Finn (page 23), contained four sentences. Published professional studies provide examples of the types of analyses that can be done to estimate the effects that incinerators and other similar projects -toxic waste sites, environmental contamination (brownfields), and concentrated livestock facilities (CAFOs)- can have on local property values.¹⁶ The "Economic Impacts" report consisted of an email from Henry Hardy containing a single sentence describing the economic upside of the project. A similar approach was taken for the other topics as well. The discussion of wastewater issues contains not a single mention of the PPCPs, EDCs, and other toxic contaminants in the sewage effluent.

Since no local air-quality "expert" could be found, the Mayor hired a consulting firm, GZA GeoEnvironmental, to review the information on air quality and sound impacts produced by Epsilon Associates and submitted by the applicant as part of the Environmental Notification Form (ENF). In consultation with the applicant, GZA produced an 8-page report titled "Independent Review of Air Quality Impact Analysis and Noise Study Performed in Support of Pioneer Renewable Energy Facility".¹⁷ It should be noted that the applicant's ENF information stated that only "100% pure water vapor" will be released by the cooling towers, but this unsubstantiated statement was not addressed in the GZA review. Since Madera Energy submitted no analysis or information concerning the PPCPs, EDCs, and toxic chemicals that will be emitted by vaporizing contaminated sewage effluent, GZA didn't have anything to review regarding the use of recycled contaminated sewage effluent, and the topic wasn't addressed in their review, even though the issue had been continuously raised in public testimony.

The legitimate public concerns about the degraded air-quality, toxic exposures, and health impacts from volatilizing hundreds of gallons per minute of contaminated sewage effluent were not addressed by the Mayor's "expert's study" nor by the GZA "independent report". An honest analysis of the obvious risks to the public has yet to be conducted.

Known Risk Factors

Pharmaceuticals and many classes of over-the-counter drugs and prescription medications are intentionally designed to have significant biological effects at extremely low doses. Modern anti-cancer or chemo-therapy drugs are so toxic that the Occupational Safety and Health Administration (OSHA) regulations allow a zero-tolerance for exposure during manufacturing and administration of the drugs. The National Institute for Occupational Safety and Health (NIOSH) gives the following caution in its publication Preventing Occupational Exposures to Antineoplastic and Other Hazardous Drugs in Health Care Settings : "Warning! Working with or near hazardous drugs in health care settings may cause skin rashes, infertility, miscarriage, birth defects, and possibly leukemia or other cancers." What is the risk associated with the long-term, constant inhalation or inadvertent ingestion of these extremely toxic drugs and active pharmaceutical ingredients discharged from Franklin Medical Center, other medical offices, veterinary clinics, and similar sources which may be present in the inadequately treated sewage effluent? Therapeutic exposures to extremely toxic drugs are considered to be beneficial when used to treat a disease or its symptoms, even if the treatment for an existing cancer may result in an increased likelihood of genetic damage and the development of other unrelated cancers later in life. Such uses follow the informed-consent standard and all medications are required to be accompanied by extensive caution statements and descriptions of known or possible side-effects. Unintentional exposures are often felt to be an unwelcome intrusion and something which the exposed person would never voluntarily give consent for. Such exposures are often perceived as negative, can cause distress, and may result in harm without providing any direct positive benefit.¹⁸

Exposure to toxic contamination can be measured in numerous ways, such as acute, chronic, cumulative, and in other more complex and technical ways. The use of many toxic medications, such as the blood thinner Coumadin which is also the rat-poison Warfarin, must be monitored very carefully in order to prevent a toxic exposure that could injure or kill the patient. Unintentional exposures to toxins are not carefully controlled, although the recent development of "bio-monitoring" techniques has increased the knowledge of our widespread exposure and subsequent "Body Burden" of synthetic industrial chemicals.¹⁹ While we now know that we are unwillingly being exposed to all manner of toxic compounds, the risks associated with these chemicals is not clear.

The key concept to understand about the risks associated with contaminant exposure can be summarized by the following equation:

$$\text{Risk} = \text{Toxicity} * \text{Exposure}$$

The harm done to the exposed organism further depends on the individual susceptibility which varies by species, age, sex, health level, genetic predisposition, and other factors.²⁰ It is well known that babies and children are most at risk from low levels of lead exposure which may cause permanent neurological impairment and life-long learning disabilities. Another example of this is the individual variability to bee stings or peanut allergies. Some individuals or entire classes of people may be more sensitive than others. This information has to be taken into consideration when attempting to characterize risks and assess potential impacts.

The above equation shows that even for things with very low toxicity, long-term exposure can eventually result in significant risk. Cigarette smoke is a good example, as smoking a single cigarette is not likely to kill someone, but long-term smoking is known to result in all sorts of increased risks for heart disease, lung disease, and various cancers. The best approach to take when the toxicity of compounds is suspected is to utilize methods of personal protection, such as that used by first responders when they show up at the scene of a chemical spill, or to use management techniques that greatly minimize or completely eliminate exposure. Common sense and numerous laws require that known exposures must be managed to reduce the risks to workers and the general public. No attempts were made by the applicant or the City of Greenfield to identify or characterize the toxic exposure that will occur due to the use of contaminated sewage, and no effort has been made to address the expected risk management issues.

Inappropriate Use of Sewage Effluent

The City of Greenfield is now very aware of the serious concerns associated with the use of contaminated sewage effluent. Even after repeated requests, all levels of government have failed to address the issue. The decision makers have acted as if the problem does not exist, even after hearing hours of testimony from dozens of concerned citizens who repeatedly raised the issue of volatilizing large quantities of sewage effluent contaminated by dangerous pharmaceuticals, endocrine disrupting compounds and hormonally active chemicals. The use of contaminated Greenfield sewage effluent in the wet-cooling process can be classified as an inappropriate use. Based on the characteristics of the contaminated material, and the fact that it is being sold for an inappropriate purpose, the effluent could be legally classified as a defective product.

This means that the city of Greenfield could be selling an intentionally defective product, contaminated wastewater, for a use for which it is clearly unsuitable. Such use could be a contributing factor to an illness, death, or other manifestation such as birth defects or fetal impairment. This inappropriate use could subject several classes of vulnerable individuals to injurious exposure to known carcinogens, mutagens, suspected teratogens (a drug or other substance capable of interfering with the development of a fetus, causing birth defects), and other hormonally active and endocrine disrupting compounds.

The scientific literature on this subject is still expanding, but extensive published studies have already concluded that intentional exposures to these hormone-mimicking agents would constitute serious risk due to the constant nature of the inhalation route.²¹ The classes of those potentially exposed would include, but not be limited to: pregnant women; all women of

childbearing age; women who develop breast cancer; children with learning disabilities and developmental delay; asthmatics; chemically-sensitive individuals; persons with compromised immune systems due to AIDS or auto-immune disease (IBD, GBS, Lupus, MS, etc.); chronic disease sufferers (cancer, copd, diabetes, liver disease, heart disease); overweight and obese individuals; patients taking psychoactive medications for treatment of chemical imbalances; men suffering from prostate cancer or enlarged prostate syndrome (BPH); organ transplant recipients taking immuno-suppressing drugs; and patients undergoing chemotherapy treatments.

Regulatory Perspective

A. Local Sewer Use Regulations:

Use of sewage effluent in a manner that intentionally degrades air quality and creates a public health nuisance is clearly in violation of the spirit and intent of Greenfield's sewer use regulations. Article I, Purpose and Policy, (b), states that "The objectives of these regulations are: To prevent the introduction of pollutants into the municipal wastewater system which will pass through the system, inadequately treated, into receiving water *or the atmosphere...*" (emphasis added).

B. State Regulations:

The MA DEP has issued guidance for the reuse of wastewater in a document titled Revised Interim Guidance: Effective Date – 1/3/00.²² It is the stated policy of DEP that:

"The water quality criteria for the treated wastewater is extremely rigorous, requiring that reclaimed water be virtually pathogen and contaminant free."
"Best Management Practices aimed at minimizing direct human exposure will be required of all projects."

The guidance further states:

"...encourage the innovative reuse of treated wastewater while continuing to consider the public's health as the controlling factor...by: controlling chemical contaminants; limiting public exposure; maintaining levels of chemicals and pathogens so that they pose no appreciable risk of harm to health or the environment, considering both planned and occasional unplanned exposure or changes in site conditions and use; and implementation of site specific best management practices and public awareness programs that promote safe use."

The City of Greenfield has not addressed the above policy which requires consideration of the public's health, and instead intends to expose the public to large quantities of sewage effluent while doing nothing to address the appreciable risk of harm to health or the environment. The guidance also includes a section on the requirements for "Public Awareness" for any reclaimed water use project:

"Experience nationally demonstrates that an early, open, and thorough public awareness effort on the part of entities utilizing reclaimed water is very effective in diminishing

the fears and suspicions frequently encountered when considering the use of reclaimed water.

To promote consumer acceptance of reclaimed water, the DEP recommends that purveyors and end users continually inform the public, especially potential users, of project status as regulatory and infrastructure decisions are being formulated. This should aid in the public's understanding of the safeguards and rigorous consideration the project is being given and will provide a sense of involvement and inclusion."

The City of Greenfield has chosen to ignore the DEP requirements for public involvement and consumer acceptance. Instead the City has followed a process which seemed to ignore, belittle, disregard, misdirect, dismiss, and alienate the public.

The MA DEP has codified the reuse of sewage effluent in the regulations²³ found at 314 CMR 20.00 which specifically allow the reuse of reclaimed effluent at 20.17(1)(a) 2. Cooling Water:

Class A reclaimed water may be used for industrial or commercial cooling or air conditioning where aerosols or other mists are created, including, without limitation, cooling towers, evaporative condensers, or spray mechanisms. When a cooling system uses Class A reclaimed water in conjunction with an air conditioning facility that utilizes a cooling tower or otherwise creates a mist that may come into contact with employees or members of the public, the cooling system shall comply with the following:

- a. drift eliminator shall be used whenever the cooling system is in operation.
- b. Chlorine or other biocide shall be used to treat the cooling system recirculating water to minimize the growth of LEGIONELLA and other microorganisms.

However, this is the only section of the DEP regulations that mentions the reuse of sewage effluent in cooling towers and nowhere in the regulations are the terms "pharmaceuticals", "personal care products", endocrine disrupting compounds", hormonally active", or "emerging contaminants" found. Overall the DEP regulations predominantly envision the reuse of reclaimed sewage water for agricultural irrigation, landscaping use, car washing, toilet flushing, and groundwater recharge. The vaporization and volatilization of hundreds of gallons of sewage effluent per minute for wet-cooling of incinerators does not seem to have been envisioned when these regulations were written. The controversial topic of PPCPs and EDCs in sewage effluent is likewise not addressed by these regulations.

Still, the regulations give DEP the ability to apply the standards found at 20.17: Special Permit Conditions, (10) Other Special Conditions which allows that the "Department may also require the implementation of specific source control and pollution prevention measures and other best management practices aimed at protecting water quality, the public health and the environment." Even though the regulations were not written to address the specific type of sewage effluent reuse that is proposed in Greenfield, and the scale of exposure that would result from this use, there is sufficient language in the regulations to preclude this use based on unacceptable risk to public health and the environment.

C. Abatement of Public Nuisance laws:

The Greenfield Board of Health has the authority to regulate the discharge of contaminants to the air under M.G.L. Chapter 111 Section 31C.²⁴

“A board of health, or other legal authority constituted for such purpose by vote of the town or city council shall have jurisdiction to regulate and control atmospheric pollution, including, but not limited to, the emission of smoke, particulate matter, soot, cinders, ashes, toxic and radioactive substances, fumes, vapors, gases, industrial odors and dusts as may arise within its bounds and which constitutes a nuisance, a danger to the public health, or impair the public comfort and convenience.”

In addition, the proposed use of sewage effluent must be approved by the Greenfield Board of Health before it can be approved by the MA DEP. Pursuant to M.G.L. Chapter 111; Section 143, NOISOME TRADES.²⁵

“Trade or employment attended with noisome and injurious odors; assignment of places; prohibition; appeal

Section 143. No trade or employment which may result in a nuisance or be harmful to the inhabitants, injurious to their estates, dangerous to the public health, or may be attended by noisome and injurious odors shall be established in a city or town except in such a location as may be assigned by the board of health thereof after a public hearing has been held thereon, subject to the provisions of chapter forty A and such board of health may prohibit the exercise thereof within the limits of the city or town or in places not so assigned, in any event. Such assignments shall be entered in the records of the city or town, and may be revoked when the board shall think proper.”

The Greenfield Board of Health can also find that the specific type of sewage effluent reuse that is proposed in by Pioneer Renewable Energy, and the scale of the exposure that would result from this use, represents an unacceptable risk to public health and the environment. The Board could either deny the discharge of the pollutants from the cooling towers by enacting regulations, or it could refuse to assign the proposed site as suitable for the intended use, based on the unacceptable inhalation exposure that will occur from the gaseous and aerosol discharges emitted during the wet-cooling process. The applicant must come before the Board of Health and request a site assignment and the Board must hold a Public Hearing to discuss the proposed use of contaminated sewage effluent for wet-cooling at the incinerator.

Summary

In summary, while many communities and state and local governments are developing innovative ways to significantly reduce or eliminate toxic material use and exposure, the City of Greenfield is developing an industrial process that will expose thousands of people to uncontrolled toxic emissions of pharmaceuticals, drugs, medications, personal care products, endocrine disrupting compounds, persistent organic pollutants, and other dangerous chemicals.²⁶

Extensive public comments about the dangers of using contaminated sewage effluent have been ignored, public officials have tried to downplay the risks, and permits have been approved without a clear understanding of the complex toxicology involved, because the City has not undertaken a truly independent expert review. Although overwhelming evidence and extensive scientific literature clearly indicates that our society needs to do everything it can to reduce our exposure to toxic materials, the proposed use of contaminated sewage effluent will result in constant and sustained toxic exposure for entire classes of vulnerable persons without the individual's awareness or consent.

The City of Greenfield decision makers have not addressed these legitimate concerns in any substantive manner, have issued approvals and permits without conducting any truly independent analyses, and have excluded the public from the decision making process. The public continues to express its concerns that widespread, serious, and negative impacts to public health and the environment may result from the use of inadequately treated sewage effluent.

The Precautionary Principle²⁷ states:

"When an activity raises threats of harm to human health or the environment, precautionary measures should be taken even if some cause-and-effect relationships are not fully established scientifically." *from the January 1998 Wingspread Statement on the Precautionary Principle*

The Precautionary Principle is featured in the two major reference papers that the MA DEP has posted on its web site about PPCPs and EDCs.²⁸ The City of Greenfield and the DEP need to carefully consider the precautionary approach and apply this principle as they consider approval of the use of contaminated sewage effluent in a way that will result in widespread exposure, unquantified environmental contamination, and unmanaged risks.²⁹

By far, the most sensible approach when dealing with the contaminants found in partially treated sewage effluent is to avoid exposing large numbers of the population to these unnecessary risks. If no other feasible alternative exists, then every practical effort should first be taken to reduce the levels of toxic contaminants entering the sewage flows, through source reduction, drug stewardship programs, and public education, then appropriate methods of advanced treatment should be studied and employed to ensure that the effluent is properly treated and filtered to remove all remaining toxic and hormonally active-compounds. This proposal to use inadequately treated sewage effluent in a manner that will release dangerous contaminants into the ground level air is ill-conceived, inadequately studied, and should not be approved without a thorough analysis and extensive public participation in the decision-making process.

Endnotes

¹ These measurements are used to characterize wastewater. BOD –biochemical oxygen demand, is a measure of the simple food value or strength of the wastewater; TSS –total suspended solids, is a gross measure of the cleanness of the water or thoroughness of particulate matter removal during the treatment process.

² See 02A-Greenfield WPCP overview, 02B-EPA fact sheet, and 02C-NPDES permit

³ See 03A-Down the Drain, <http://www.ewg.org/book/export/html/20919> ; 03B-Pharmaceuticals in Treated Wastewater Effluent, <http://ga.water.usgs.gov/nawqa/moll.pdf> ; 03C-Persistence of pharmaceutical compounds, <http://www.neiwpcc.org/ppcpconference/ppcp-docs/PaulStackelberg/Stackelberg%20et%20al%202007.pdf> ; 03D-PipeLine PPCP overview, http://www.nesc.wvu.edu/old_website/nsfc/pdf/pipeline/PL_wi07.pdf ; and 03E- Proceedings of the 2nd International Conference on Pharmaceuticals and Endocrine Disrupting Chemicals in Water October 9-11, 2001, Minneapolis, Minnesota

⁴ See 04A-Testimony by Kyla Bennett, www.peer.org/docs/ma/08_12_5_ppcp_testimony.pdf , 04B-PEER position paper, and 04C-Peer Analysis: EPA Dropping the Ball, http://www.peer.org/docs/epa/08_19_3_analysis_of_epa_ppcp_duties.pdf ; 04C-04C-Minnesota BDC Report, www.pca.state.mn.us/publications/reports/lrp-ei-1sy08.pdf

⁵ See 05A-info about a treatment process that is not used at Franklin Medical Center, <http://www.sciencedaily.com/releases/2007/12/071206231740.htm> ; 05B-Hazardous Chemicals in the Health Care Profession, <http://www.psr.org/assets/pdfs/hazardous-chemicals-in-health-care.pdf> ; 05C-Chemical & Engineering News-Contained Chemistry, <http://pubs.acs.org/cen/coverstory/86/8624cover.html> ; and 05D-Chemical & Engineering News- One Pill, Many Uses, <http://pubs.acs.org/cen/coverstory/85/8534cover.html>

⁶ See 06A-Treatment to Remove Endocrine Disrupters, <http://www.springerlink.com/content/t706uq4j5r452152/> ; 06B-Removal of EDCs during water treatment, <http://www.epa.gov/mmml/pubs/625r00015/625r00015.pdf> ; 06C- removal of Endocrine disruptors by membranes and activated carbon; 06D- TrojanUV Environmental Contaminant Treatment, http://www.trojanuv.com/resources/trojanuv//Products/TrojanUVPhox/ECT_Brochure_NEW_LR.pdf ; 06E-Removal of Natural Estrogens and Synthetic Compounds, <http://www.pjoes.com/pdf/15.1/35-40.pdf> ; and 06F-The Occurrence and Fate of Pharmaceuticals, Personal Care Products and Endocrine Disrupting Compounds in a Municipal Water Use Cycle: A Case Study in the City of Ann Arbor, http://www.a2gov.org/government/publicservices/water_treatment/Documents/EndocrineDisruptors.pdf

⁷ See 07A-Body Burden: The Pollution in Newborns <http://www.ewg.org/reports/bodyburden2/exccsumm.php> ; 07B-There is No "Away", www.cielap.org/pdf/NoAway.pdf ; 07C-Pharmaceuticals as Environmental Pollutants-EoPH2008, <http://www.epa.gov/nerlesd1/bios/daughton/EoPH2008.pdf> ; and 07D-Analysis of Ecologically Relevant Pharmaceuticals in wastewater, <http://environmentalhealthcollaborative.org/images/batt-ecopharms.pdf>

⁸ See 08-PRE ENF, Appendix F-Air Quality, <http://www.pioneerrenewableenergy.com/wp/wp-content/uploads/2009/03/appendixb-airquality.pdf>

⁹ See 09A-EPA Guide to Air Stripping, <http://clu-in.org/download/citizens/airstripping.pdf>

¹⁰ See 10-Steam Stripping brochure, www.jaeger.com/Brochure/steamstripping.pdf

¹¹ See 11-ENDOCRINE DISRUPTORS IN THE ENVIRONMENT, <http://www.iupac.org/publications/pac/2003/pdf/7505x0631.pdf>

¹² See 12-Good Genes Gone Bad, <http://www.prospect.org/cs/articles?articleId=11315>

¹³ These questions were submitted to the Greenfield ZBA on 6/15/09 & 6/25/09, and to MA DEP on 6/11/09.

¹⁴ See 14-Umass Sewage Reuse summary, <http://www.districtenergy.org/pdfs/08CampConference/Proceedings/5A3MathewsIDEACampus08.pdf>

¹⁵ See 15-Mayor's Task Reports except GZA

¹⁶ See 16A- Brownfields and Property Values, www.epa.gov/ncsr/publications/workshop/pdf/EE-0428-01.pdf ; 16B- Hazardous waste sites and Housing Appreciation Rates, <http://www.ses.wsu.edu/PDFFiles/JournalArticle/McCluskey/Housing%20Appreciation%20Rates.pdf> ; 16C-The Impact of Livestock Facilities on Rural Residential Property Values, <http://www.card.iastate.edu/publications/DBS/PDFFiles/03wp342.pdf> ; 16D-Toxic Sites and Housing Appreciation Rates, http://www.holycross.edu/departments/economics/RePEc/Kiel_Woburn.pdf ; 16E-Kiel_HouseValues,

http://www.holycross.edu/departments/economics/RePEc/Kiel_HouseValues.pdf; and **The Effect of an Incinerator Siting on Housing Appreciation Rates** (available on-line by subscription only), <http://www.sciencedirect.com/science/article/B6WVG-45R8GBT-V/2/a30035a63147fcd517ca4d63e4c1dd8f>

¹⁷ See 17A- GZA Scope of Work 8-24-09 email exchange, and 17B-GZA Air Pollution Report, http://www.montaguema.net/Content/NetSite_720/groups/208/files/GZA_air_pollution_report.pdf

¹⁸ See 18A-Agents of Subtle Change, <http://www.ehponline.org/members/1999/suppl-6/907-938daughton/daughton-full.html>; 18B-Preventing Occupation Exposure to Antineoplastic & Other Haz Drugs, <http://origin.cdc.gov/niosh/docs/2004-165/pdfs/2004-165.pdf>; 18C-Preventing Occupational Exposures to Antineoplastic Drugs, <http://caonline.amcancersoc.org/cgi/reprint/56/6/354.pdf>; 18D-Chemo Agents Mgt and Disposal, http://www.medserve.com/filelib/FileCabinet/Envirosolve/Chemo_Agents_Mgt_and_Disposal_5.3.07.pdf; and 18E-Safe Handling of Hazardous Drugs, <http://www.nursingworld.org/MainMenuCategories/ANAMarketplace/ANAPeriodicals/OJIN/TableofContents/Vol9me92004/No3Sept04/HazardousDrugs.aspx>; , http://www.osha.gov/dts/osta/otm/otm_vi/otm_vi_2.html;

¹⁹ See 19-EWG Body Burden, http://archive.ewg.org/reports/bodyburden1/pdf/B3Report_final.pdf

²⁰ See 20A-Does the Dose Make the Poison? http://www.endocrinedisruption.com/files/2007-04-30_does_the_dose_make_the_poison.pdf

²¹ See 21A-Endocrine disrupting chemicals in indoor and outdoor air, http://s20428.gridserver.com/pdf/our_publications/Rudel_RA2009.pdf; 21B-Comments on Medical Waste Incinerator Regulations, (not available on-line); and 21C-The Significance of Factors beyond Direct Excretion to Sewers (available on-line by subscription only)

²² See 22-DEP Policy #: BRP/DWM/PeP-P00-3, <http://www.mass.gov/dep/water/reuse.pdf>

²³ See 23-314 CMR 20.00: Reclaimed Water Permit Program and Standards - Promulgated March 2009, <http://www.mass.gov/dep/service/regulations/314cmr20.pdf>

²⁴ See 24A-Chapter 111- Section 31C -Atmospheric pollution, <http://www.mass.gov/legis/laws/mgl/111-31c.htm>, and 24B-DEP c.111 s. 31c Guidance, <http://www.mass.gov/dep/air/laws/31cguid.pdf>

²⁵ See 25-Chapter 111, Section 143 -Noisome Trades, <http://www.mass.gov/legis/laws/mgl/111-143.htm>

²⁶ See 26A-Beyond the Medicine Cabinet, <http://www.epa.gov/nerlesd1/bios/daughton/EnvInt2008.pdf>; 26B-Pharmaceuticals in the Environment-Sources and Their Management, http://www.epa.gov/nerlesd1/bios/daughton/Chap1_Petrovic&Barcelo.pdf; 26C-Drug Usage and Disposal-Daughton, http://environmentalhealthcollaborative.org/images/Daughton_RT_Environmental_Health_Collaborative_-_presentation_%2820Oct08%29.pdf

²⁷ See 27-Precautionary Principle Handbook, <http://www.biotech-info.net/handbook.pdf>

²⁸ See 28-DEP Web Page, <http://www.mass.gov/dep/toxics/ppc.htm#research>; 28A-Pharmaceuticals in the Water: A Look at an Emerging & Pressing Issue, Report by Executive Office of Energy & Environmental Affairs intern & Brandies University student Nina Savransky, <http://www.mass.gov/dep/toxics/stypes/pharmh2o.pdf>; 28B- Investigating Emergent Contaminants: Pharmaceutical Impacts & Possible Solutions 2007, Prepared by Leah Bowe as part of a research project funded by the Rappaport Institute for Greater Boston, Kennedy School of Government, Harvard University, http://www.mass.gov/dep/toxics/stypes/ec_bowe.pdf.

²⁹ See 29-Water Reuse and Health Risks – Real vs Perceived, S. Toze, (available on-line by subscription only), http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6TFX-4J444DP-8&_user=10&_rdoc=1&_fint=&_orig=search&_sort=d&_docanchor=&_view=c&_searchStrId=1103880397&_rerunOrigin=google&_acct=C000050221&_version=1&_urlVersion=0&_userid=10&md5=7cef646cbedd1195f9efa936e9f6c81

MEDICINES RECOMMENDED FOR DISPOSAL BY FLUSHING

This list from FDA tells you what unused or expired medicines you should flush down the sink or toilet to help prevent danger to people and pets in the home. Flushing these medicines will get rid of them right away and help keep your family and pets safe. FDA continually evaluates medicines for safety risks and will update the list as needed.

<i>Medicine</i>	<i>Active Ingredient</i>
Actiq , oral transmucosal lozenge	Fentanyl Citrate
Avinza , capsules (extended release)	Morphine Sulfate
Daytrana , transdermal patch system	Methylphenidate
Demerol , tablets *	Meperidine Hydrochloride
Demerol , oral solution *	Meperidine Hydrochloride
Diastat/Diastat AcuDial , rectal gel	Diazepam
Dilaudid , tablets *	Hydromorphone Hydrochloride
Dilaudid , oral liquid *	Hydromorphone Hydrochloride
Dolophine Hydrochloride , tablets *	Methadone Hydrochloride
Duragesic , patch (extended release) *	Fentanyl
Embeda , capsules (extended release)	Morphine Sulfate; Naltrexone Hydrochloride
Fentora , tablets (buccal)	Fentanyl Citrate
Kadian , capsules (extended release)	Morphine Sulfate
Methadone Hydrochloride , oral solution *	Methadone Hydrochloride
Methadose , tablets *	Methadone Hydrochloride
Morphine Sulfate , tablets (immediate release) *	Morphine Sulfate
Morphine Sulfate , oral solution *	Morphine Sulfate
MS Contin , tablets (extended release) *	Morphine Sulfate
Onsolis , soluble film (buccal)	Fentanyl Citrate
Opana , tablets (immediate release)	Oxymorphone Hydrochloride
Opana ER , tablets (extended release)	Oxymorphone Hydrochloride
Oramorph SR , tablets (sustained release)	Morphine Sulfate
Oxycontin , tablets (extended release) *	Oxycodone Hydrochloride
Percocet , tablets *	Acetaminophen; Oxycodone Hydrochloride
Percodan , tablets *	Aspirin; Oxycodone Hydrochloride
Xyrem , oral solution	Sodium Oxybate

*These medicines have generic versions available or are only available in generic formulations. List revised: August 2009 From:

<http://www.fda.gov/Drugs/ResourcesForYou/Consumers/BuyingUsingMedicineSafely/EnsuringSafeUseofMedicine/SafeDisposalofMedicines/ucm186187.htm>

Antineoplastic Agents That are Classified as Known or Probable Human Carcinogens,
Adapted from the International Agency for Research on Cancer.

Group 1 (Human Carcinogens)

Arsenic trioxide
Azathioprine
Chlorambucil
Chlornaphazine
Cyclophosphamide
Myleran
Melphalan
Semustine
Tamoxifen
Thiotepa
Treasulfan
Mustargen-Oncovin-Procarbazine-Prednisone (MOPP)
Etoposide-Cisplatin-Bleomycin (ECB)

Group 2A (Probable Human Carcinogens)

Azacitidine
BCNU
CCNU
Chlorozotocin
Cisplatin
Doxorubicin HCl
N-Ethyl-N-nitrosourea
Etoposide
Mechlorethamine HCl
N-Methyl-nitrosourea
Procarbazine HCl
Teniposide

Antineoplastic Agents That are Classified as Pregnancy Category D* or X†

Drug	Drug	Drug	Drug	Drug	Drug		
Arsenic trioxide	D	Azathioprene	D	Bleomycin	D	Capecitabine	D
Carboplatin	D	Carmustine	D	Chlorambucil	D	Cisplatin	D
Cladribine	D	Cyclophosphamide	D	Cytarabine	D	Dactinomycin	D
Daunorubicin HCl	D	Docetaxel	D	Doxorubicin HCl	D	Epirubicin	D
Etoposide	D	Floxuridine	D	Fludarabine	D	Fluorouracil	D
Gemcitabine	D	Hydroxyurea	D	Imatinib mesylate	D	Interferon alfa-2b	X
Irinotecan HCl	D	Ibritumomab tiuxetan	D	Idarubicin	D	Ifosfamide	D
Leflunomide	X	Lomustine	D	Mechlorethamine HCl	D		
Melphalan	D	Mercaptopurine	D	Methotrexate	X	Mitoxantrone HCl	D
Oxaliplatin	D	Paclitaxel	D	Pipobroman	D	Procarbazine	D
Tositumomab	X	Tamoxifen	D	Temozolomide	D	Teniposide	D
Thalidomide	X	Thioguanine	D	Thiotepa	D	Topotecan	D
Vinblastine sulfate	D	Vincristine sulfate	D	Vinorelbine tartrate	D		

-Adapted from the US Food and Drug Administration Center for Drug Evaluation and Research.
*D = There is clear evidence of risk to the human fetus, but the benefits may outweigh the risk for pregnant women who have a serious condition that cannot be treated effectively with a safer drug.

†X = There is clear evidence that the medication causes abnormalities in the fetus. The risks outweigh any potential benefits for women who are (or may become) pregnant.

From: <http://caonline.amcancersoc.org/cgi/reprint/56/6/354.pdf>

APPENDIX VI: 2-1. SOME COMMON DRUGS THAT ARE CONSIDERED HAZARDOUS. –From OSHA TECHNICAL MANUAL - SEC VI Chap 2

Appendix VI:2-1 is not all-inclusive, should not be construed as complete, and represents an assessment of some, but not all, marketed drugs at a fixed point in time. Appendix VI:2-1 was developed through consultation with institutions that have assembled teams of pharmacists and other health care personnel to determine which drugs should be handled with caution. These teams reviewed product literature and drug information when considering each product. Sources for this appendix are the "Physicians Desk Reference," Section 10:00 in the *American Hospital Formulary Service Drug Information*, IARC publications (particularly Volume 50), the Johns Hopkins Hospital, and the National Institutes of Health, Clinical Center Nursing Department. No attempt to include investigational drugs was made, but they should be prudently handled as hazardous drugs until adequate information becomes available to exclude them. Any determination of the hazard status of a drug should be periodically reviewed and updated as new information becomes available. Importantly, new drugs should routinely undergo a hazard assessment.

CHEMICAL/GENERIC NAME	SOURCE*
ALTRETAMINE	C
AMINOGLUTETHIMIDE	A
AZATHIOPRINE	ACE
L-ASPARAGINASE	ABC
BLEOMYCIN	ABC
BUSULFAN	ABC
CARBOPLATIN	ABC
CARMUSTINE	ABC
CHLORAMBUCIL	ABCE
CHLORAMPHENICOL	E
CHLOROTIANISENE	B
CHLOROZOTOCIN	E
CYCLOSPORIN	E
CISPLATIN	ABCE
CYCLOPHOSPHAMIDE	ABCE
CYTARRABINE	ABC
DACARBAZINE	ABC
DACTINOMYCIN	ABC
DAUNORUBICIN	ABC
DIETHYLSTILBESTROL	BE
DOXORUBICIN	ABCE
ESTRADIOL	B
ESTRAMUSTINE	AB
ETHINYL ESTRADIOL	B
ETOPOSIDE	ABC
FLOXURIDINE	AC
FLUOROURACIL	ABC
FLUTAMIDE	BC

SOME COMMON DRUGS THAT ARE CONSIDERED HAZARDOUS (con't).

CHEMICAL/GENERIC NAME	SOURCE*
GANCICLOVIR	AD
HYDROXYUREA	ABC
IDARUBICIN	AC
IFOSFAMIDE	ABC
INTERFERON-A	BC
ISOTRETINOIN	D
LEUPROLIDE	BC
LEVAMISOLE	C
LOMUSTINE	ABCD
MECHLORETHAMINE	BC
MEDROXYPROGESTERONE	B
MEGESTROL	BC
MELPHALAN	ABCE
MERCAPTOPYRINE	ABC
METHOTREXATE	ABC
MITOMYCIN	ABC
MITOTANE	ABC
MITOXANTRONE	ABC
NAFARELIN	C
PIPOBROMAN	C
PLICAMYCIN	BC
PROCARBAZINE	ABCE
RIBAVIRIN	D
STREPTOZOCIN	AC
TAMOXIFEN	BC
TESTOLACTONE	BC
THIOGUANINE	ABC
THIOTEPA	ABC
URACIL MUSTARD	ACE
VIDARABINE	D
VINBLASTINE	ABC
VINCRISTINE	ABC
ZIDOVUDINE	D

*** Sources**

A - The National Institutes of Health, Clinical Center Nursing Department

B - Antineoplastic drugs in the [*italicize the following text name*] Physicians' Desk Reference

C - American Hospital Formulary, Antineoplastics

D - Johns Hopkins HospitalE - International Agency for Research on Cancer

Greenfield

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Pharmaceutical Testing Public Service Announcement

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Attachments:

[PSEDCLab 003.jpg](#)

Size: 877K Last Updated: 2010/1/11

[PSEDCLab 005.jpg](#)

Size: 788K Last Updated: 2010/1/11

[PSEDCLaboratory Report 2-2010.pdf](#)

Size: 574K Last Updated: 2010/2/11

[PSEDC tests results sum.pdf](#)

Size: 9.2K Last Updated: 2010/2/11

[PSEDC Air conc Impacts .pdf](#)

Size: 12K Last Updated: 2010/2/11

Town of GREENFIELD, MASSACHUSETTS

Town Hall, 14 Court Square, Greenfield, MA 01301 Phone: 413-772-1528 Fax: 413-773-9593

FOR IMMEDIATE RELEASE

DATE: 2/11/10

CONTACTS: Sandra Shields, DPW Director

TOWN RECEIVES RESULTS OF EFFLUENT TESTING FOR PHARMACEUTICALS AND ENDOCRINE DISRUPTORS

Complete test results posted on Town web site

Greenfield, MA. - The Town has received the results of the most recent testing performed on the Town's Water Pollution Control Plant effluent. This testing was the result of a request by the Concerned Citizens of Franklin County regarding the concentrations of certain pharmaceuticals, personal care products and chemicals classified as endocrine disruptors in the effluent that is proposed to be sold and further treated by Pioneer Renewable Energy (PRE) in the electrical generation facility to be built in the Industrial Park. PRE will further treat the effluent to Class A water standards before it is used in the cooling towers of the facility.

There were two samples sent to Columbia Analytical Services in Kelso, Washington. The first was a 24 hr composite sample of the WPC effluent collected on 1/10/10 to 1/11/10. The second sample, referred to as "condensate," was the product of boiling the effluent and collecting the condensate via a distillation apparatus. Five liters of the effluent were boiled and then the condensate was collected in a sample container and sent to the laboratory. The purpose of this was to attempt to replicate what would happen to the effluent in the cooling towers. The distillation process, which boiled the effluent at 212 degrees F for a prolonged period of time, was much more severe than what will happen in the cooling towers where the additionally treated effluent will quickly pass through the tower and be exposed to an average temperature of 85 degrees F. Therefore, of the chemicals that did volatilize off in the condensate, one would expect even lower concentrations to be present when exposed to lower temperatures."

Columbia Analytical tested the two samples for 32 chemicals that were representative of various classes of drugs and chemicals. This does not mean that no other chemicals are present. It is not possible or realistic to test for every chemical and compound in existence. The list Columbia developed includes different classes of drugs, volatile, non-volatile; steroids, hormones, antimicrobial, mood altering, etc. This included commonly known substances such as caffeine, Ibuprofen, testosterone and salicylic acid which is used to treat acne. It also included diazepam, an anti-anxiety medication; pentoxifylline, for improved blood flow; estradiol, used to treat symptoms of menopause; and triclosan, an antimicrobial commonly used in hand soaps. Chemicals were measured in nanograms per liter. 1 ng equals



0.000000000002 pounds.

A complete copy of the laboratory report, description of the drugs/chemicals and detailed calculations used for the discussion in this press release can be obtained from the Town web site. Go to the Dept of Public Works, click on this press release which is listed under "News and Notices". In the top left corner you will see the attachments.

THE RESULTS:

- The testing of the effluent detected extremely low concentrations of 20 out of the 32 compounds that were tested for, with the remaining compounds below detection limits. Concentrations in the effluent range from 3.5 ng/l for atrazine, a herbicide to 2100 ng/l for gemfibrozil, a lipid regulator. Only 9 of the 32 compounds appeared in the condensate meaning that approximately one-half of the compounds were not volatilized. To put the results in perspective, one of the compounds detected was ibuprofen, the commonly used anti-inflammatory. A regular tablet of ibuprofen is 200 mg. The results show that it would take someone outside 24/7 at the nearest residence over 25 billion years to breathe in the equivalent of one tablet of ibuprofen. It would take nearly 4 billion years for someone at that same spot to breathe in the equivalent of the amount of caffeine in a cup of coffee. For a volatile compound such as fluoxetine (Prozac) it would take 25 million years to breathe in the standard 20 mg dose. These numbers were calculated based on air modeling done for the project, utilizing a DEP-approved model and five years of weather data. These calculations are available on the DPW web site.
- Non-volatile compounds cannot be released as vapor, so the only way they can escape from the cooling tower is in water droplets carried away from the cooling tower, known as drift. Of the approximately 700,000 gallons of water supplied to the cooling tower each day, the majority is evaporated and the remaining 115,000 gallons are returned to the sewer. Less than 250 gallons per day leaves the cooling tower as drift.
- Volatile, or potentially volatile, compounds were assumed to be fully volatilized in the cooling tower which is a conservative assumption. This means that 100% of any volatile compound entering the cooling tower would be emitted as a gas. Higher concentrations occur at the project's fence line, and decrease outside the property; levels at the closest residence are approximately 250 times lower than at the fence line. These levels would continue to decrease the further one would get from the property.

Quotations:

Mayor William Martin

"As has been stated in the past, effluent, most of which is treated far less than the effluent PRE will use in the cooling towers, is commonly used in power plants throughout the United States. This is not a new concept. I believe this most recent testing demonstrates that the impacts of using effluent for cooling will not compromise the health and safety of the community or surrounding area. In addition, the sale of this effluent will provide an important new source of revenue which will support town services. If Pioneer is not able to use effluent the plant can still be constructed using dry cooling and the Town would lose approximately \$500,000 per year from the sale of the effluent"

