RESPONSE TO PUBLIC COMMENTS FOR
DRAFT NPDES PERMIT NH0100447

CITY OF MANCHESTER
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On July 14, 2008, the U.S. Environmental Protection Agency (EPA) and the New Hampshire Department of Environmental Services, Water Division (NHDES-WD) released for public notice and comment, a draft National Pollutant Discharge Elimination System (NPDES) permit for the above draft NPDES permit. The public comment period for this draft permit expired on August 12, 2008.

The following comments were received from t**he City of Manchester** during the public comment period:

Comment No. 1: ALUMINUM

Aluminum – Background

The proposed limit for aluminum in the draft NPDES is 87ug/l. The limit was set using the National Recommend Water Quality Criteria for Non-Priority Pollutants. The chronic criteria for fresh water is 87 ug/l while the acute criteria is 750 ug/l. However, a footnote to these published criteria indicates the following:

"There are three major reasons that the use of water-effect ratios might be appropriate. (1) The values of 87 ug/l is based on a toxicity test with the striped bass in water with pH= 6.5-6.6 and hardness less than 10 mg/l. Data in "Aluminum Water Effect Ratio of the 3-MGD Plant Effluent Discharge, Middleway West Virginia" May 1994 indicate that aluminum is substantially less toxic at higher pH and hardness, but the effects of pH and hardness are not well quantified at this time. (2) In tests with brook trout at low pH and hardness, effects increased with increasing concentrations of total aluminum even though the concentration of dissolved aluminum was constant, indicating that total recoverable aluminum is a more appropriate measurement than dissolved, at least when particulate aluminum is primarily associated with hydroxide particles. In surface waters, however, the total recoverable procedure might measure aluminum associated with clay particle, which might be less toxic than aluminum associated with aluminum hydroxide. (3) EPA is aware of field data indicating that many high quality waters in the US contain more than 87ug/l aluminum, when either total recoverable or dissolved is measured."

All other limits within Manchester's previous and current draft permits are developed allowing for a dilution factor to assure that treatment plants ***do not contribute*** to water quality impairments. Manchester has a proposed dilution factor of 11.81: 1. If the dilution factor was considered, the permit limit for aluminum should be 1.027 mg/l.

The NHDES had presented 23 data sets within the Merrimack River on aluminum concentrations. Eleven of these data points were from above the Manchester outfall and 12 were from below the Manchester outfall. All of these were grab samples. In the NHDES review of this data, the NHDES has determined that some of the samples have exceeded the 87 ug/l chronic water quality criteria for aluminum. All samples ranged from a low of 34 ug/l to a high of 480 ug/l. Fifteen out of the 23 samples were below the chronic value of 87 ug/l.

Aluminum – Directive

The EPA/NHDES is requiring that Manchester meet the Gold Book chronic standard criteria of 87 ug/l due to aluminum impairment in the Merrimack River. This provides Manchester with less than 8.5% of the standard allocation when factoring in dilution. The EPA/NHDES is withholding 91.5% of Manchester's pollutant load allowance to offset pollution that was either historically deposited in the sediment within the Merrimack, or is being discharged by other sources within the Merrimack River basin above the Manchester outfall.

Review of the data indicates that there is no water quality violation for chronic criteria, and certainly none for the acute criteria. Chronic quality criteria are based on long-term composite sampling that indicates a receiving water's base loading meets or exceeds a certain numerical limit. The grab sample data strongly indicates that the real base loading may be in the 50 ug/l to 60 ug/l range. None of the grab samples approached the 750 ug/l acute daily level for species toxicity. Manchester is hard pressed to accept minimal upstream and down stream grab-sampling data as a basis for setting such a restrictive numerical limit within our permit.

Supporting fact sheet narrative (Page 13 of 33, first paragraph), *"The dissolved oxygen data collected by the NHDES and shown in the chart above is based on grab samples so is of limited use in assessing compliance with State water quality standard, which is based on a daily average, but does not show any percent saturation less than 75."*

The above statement demonstrates that grab samples are of "limited use" in assessing full compliance. This statement works in favor of the EPA/NHDES when all the oxygen saturation levels below the Manchester outfall (Page 12 of 13, 08 MER[2]) clearly indicate that Manchester exceeds the 75% saturation criteria in all samples. Yet, the narrative on page 11 of 33, third paragraph under the Phosphorus heading, states, "*The aquatic life use is not supported because of aluminum and dissolved oxygen saturation.…"*

The reasoning behind discounting the D.O. results based on grab sampling leans heavily in favor of the EPA/NHDES moving toward a phosphorus limit. The interpretation of the results favors their case. Manchester will take this same reasoning to present its case for aluminum. "The aluminum data collected by the NHDES, and shown in the chart on Page 10 of 33, is based on grab samples. This data is of "limited use" in assessing compliance with the Gold Book standard for chronic water quality criteria, which is based on long-term sampling and exposure to a minimum base load of contaminant (87 ug/l). The grab

samples do show that in no case was the acute limit of 750 ug/l exceed during any one day maximum sampling event.

Aluminum – Comparison of Data to Dilution Factor Concentration

A review of the upstream and downstream aluminum concentrations indicates that pollutant offset for upstream contamination is being requested by the NHDES of the City of Manchester. Some of the early sampling, provided in the permit fact sheet, where the Gold Book standard for chronic toxicity was exceeded downstream from Manchester's outfall did not have corresponding upstream data to extrapolate the total Manchester contribution.

One sample on June 20, 2002 had an upstream impact of 0.089 mg/l with a downstream impact of 0.1 mg/l. If the total aluminum difference came from Manchester's outfall, then the treatment plant's contribution during that sampling was 0.011 mg/l (12.7% of the 87 ppb chronic value).

All the downstream exceedances in 2005 and 2006 were a direct result of upstream contribution.

Date	Downstream	Upstream	Manchester Impact
June 17, 2005	0.48 mg/l	0.433 mg/l	0.047 mg/l
July 15, 2005	0.11 mg/l	0.099 mg/l	0.011 mg/l
June 16, 2006	0.195 mg/l	0.177 mg/l	0.018 mg/l
July 14, 2006	0.334 mg/l	0.403 mg/l	-0.069 mg/l

The analysis suggests that Manchester's worse case potential for aluminum contribution is anywhere between 12.7% and 54% of the chronic value considered in stream analysis. This runs parallel to the measured toxicity aluminum analysis done every quarter in which the fact sheet reported effluent discharge concentrations of 0 ug/l to 510 ug/l (page 10 of 33 paragraph three of the fact sheet). The high of 510 ug/l is 50.34% of the 1.027 mg/l limit when the dilution factor is applied.

There were no WQ violations for the 2007 random sampling events. When comparing the upstream vs. downstream concentrations, the upstream value was higher in one of the samples and the two other samples indicate that Manchester did have a worse case potential of 0.011 mg/l. Again this is 12.7% of the 87 ug/l chronic toxicity Gold Book value.

Aluminum – Community Impact

The restriction imposed by the NHDES is parallel to an involuntary pollutant trade mechanism that has no benefit for the donor community. Pollutant trading is being used in regions around the country in areas regarding water pollutant credits and air pollutant credits. The benefit to pollutant trading is one community negotiates with another (in instances the state or federal agencies will mediate and approve the trading) with one

community receiving a specific load allocation for a pollutant from another community and the other community receives a different allocation or a monetary consideration. In effect, the EPA/NHDES has seized 91.5% of Manchester's load allocation benefit without any input or benefit to our community.

The biggest impact on the community, should the City agree to the 87 ug/l limit as proposed, is that it would place the City in immediate violation of the draft 5-year NPDES Permit. This is evident from the 510 ug/l measured aluminum in one of the quarterly toxicity analysis. This would place Manchester in line for an immediate Administrative Order to take action to assure 100% compliance with the new 87 ug/l limit. Manchester would be in line to spend hundreds of thousands of dollars, if not millions, to come into compliance with the new limit. This large capital and ongoing O&M cost would be needed to offset pollution that was contributed by upstream communities.

Aluminum – Fiscal Impact

This has a far-reaching monetary impact on the City of Manchester. The 87 ug/l effluent limit would require Manchester to enter into an AO with the EPA/NHDES to begin study of treatment alternatives, design, construction, and O&M costs for the removal of aluminum in the wastewater effluent.

The permit also requires monitoring for phosphorus with the expectation that the next issued permit will have a specific phosphorus limit once a TMDL is developed within the Merrimack River watershed. Should a future phosphorus limit of 1.0 mg/l or above be imposed on the Manchester WWTF biological phosphorus removal or chemical phosphorus removal would be employed to meet these limits. However if a limit less than 1.0 mg/l of phosphorus is imposed on the Manchester WWTF it is likely that some means of chemical phosphorus removal would be employed (either separately or in addition to biological phosphorus removal). Typically aluminum salts are the least expensive and most desirable chemicals for implementing chemical phosphorus removal.

The use of biological phosphorus removal would require significant upgrades to the existing solids handling process in order to maintain aerobic conditions for the biological phosphorus removal sludges. These upgrades might include a new technology for the thickening of the combined primary and secondary sludges, the separation of the primary and secondary sludge with the addition of a new waste sludge thickening technologies, the construction of new storage and blending tanks if the sludges are separated, or an aerated storage tank if the sludges are co-thickened. These solids handling upgrades while potentially desirable would not be required for a chemical phosphorus removal alternative.

The implementation of an 87 ug/l effluent aluminum limit would require the use of either biological phosphorus removal or the use of chemical phosphorus removal with a more expensive and less desirable chemical.

Manchester could be incurring significantly more costs to address a phosphorus limit in the future based on the 87 ug/l aluminum limit in lieu of the 1.027 mg/l limit.

The Manchester WWTF is currently in discussions with the Manchester Waterworks (MWW) to determine if the Manchester WWTF could receive the MWW sedimentation basins sludge decant which is currently causing issues with the MWW ozonation operations. The preliminary evaluation of the receipt of this decant at the WWTF has indicated that it would likely have no detrimental impact on the WWTF. However, this decant does contain aluminum at concentrations in excess of 87 ug/l. As a result it will be recommended that the decant not be received at the WWTF due to the decants exceedence of the proposed 87 ug/l limit. As a result MWW will have to invest in capital and operational improvements to address their ozonation operation.

Again it is felt that Manchester, and ultimately their water and sewer rate payers, are bearing an unfair portion of the cost to address the 87 ug/l chronic aluminum criteria that is not a result of discharges from the Manchester WWTF.

In addition to the cost impacts for phosphorus removal and the MWW impacts, the Manchester EPD will likely incur other costs if the 87 ug/l aluminum limit is imposed. M&E's opinion is that meeting this low limit will require identification and evaluation of the sources of the aluminum in the plant influent. This source identification and evaluation would likely be implemented through the EPD industrial pretreatment program. This will impact the City's industrial users, again due to the loss of 91.5% of the City pollutant allocation.

Aluminum – Opportunities

There needs to be a concerted effort by all contributors to the Merrimack River to attempt to determine the source of aluminum. Manchester manages an industrial pretreatment program for our City, and oversees the programs of Londonderry, Bedford and Goffstown. Manchester would be willing to review these programs to determine any sources of aluminum discharge.

The NHDES manages pretreatment programs for towns that do not have industrial pretreatment programs. The NHDES IPP Coordinator could request that these discharges test for aluminum to determine that portion of the total contribution to upstream locations.

The NHDES/Army Corps is continuing the study of the Merrimack River north of Manchester to Lincoln, NH. This is an opportunity to do additional analysis from the sediment samples to determine if the pollution to the river is due to historical sediment deposits.
As the NHDES believes that aluminum is an immediate impairment, it is paramount that a long-term composite sampling program be undertaken upstream and downstream of the Manchester outfall to determine if the chronic water quality (87 ug/l) is being exceeded.

The NHDES can review all water and wastewater treatment direct and indirect discharges to the Merrimack River to determine the aluminum contribution from these treatment facilities. If aluminum is not a parameter that is routinely tested, a letter requesting this be added to future testing could determine a potential existing source.

Accelerate the TMDL development for aluminum along the Merrimack River and distribute a wasteload allocation to all contributors to the river based on the available load.

NHDES develop a pollutant trading credit mechanism and invite all cities and towns that discharge to the Merrimack River to participate within the trading program.

Aluminum – Resolution

Manchester has to take the position of only agreeing to an aluminum limit of 1.027 mg/l (full dilution factor) to protect itself from immediate violation of the draft permit and anticipated AO.

Manchester is not opposed to reopening the permit and accepting a new aluminum discharge concentration when a TMDL is developed. Manchester is also willing to work with the NHDES in developing a pollutant trading program that could be implemented within the Merrimack River watershed. Manchester EPD is contributing $66,000 over a three-year period to the upper Merrimack River watershed study. The MWW is also contributing the same amount. Manchester will request that some of this money be diverted to water and sediment sampling for aluminum.

Manchester is not opposed to negotiating with the NHDES to trade a percentage of our aluminum allocation for some other yet-to-be-determined concentration (e.g. phosphorus, flow, CBOD etc.) from the State's 10% safety reserve of all pollutants and flow. This may be a great opportunity to demonstrate the usefulness of the 10% safety offset as set within all current State of New Hampshire NPDES permits.

It is also requested that the EPA/NHDES review the in-stream aluminum in light that the alkalinity in the Merrimack River adjacent to the Manchester's outfall is greater that the 10 mg/l as noted in the above referenced footnote. The footnote establishes the fact that the EPA is aware of field data indicating that many high quality waters in the US contain more than 87ug/l aluminum.

Response No. 1:

The Merrimack River segments both upstream and downstream of the Manchester WWTF outfall location were listed on the 2006 303(d) list as "impaired" for aluminum. This action followed the listing protocol in the CALM (Consolidated Assessment and Listing Method), which is a document that underwent public review and participation before being used by DES. The 2006 303(d) list, was approved by EPA on August 30, 2007 after a period of public participation in accordance with statutory requirements.

The NPDES permit is written with effluent limitations that have to take into consideration the fact that the segments of the Merrimack River upstream and downstream of the Manchester WWTF are impaired for aluminum and the river has no assimilative capacity for dilution of excess aluminum in its effluent.

The surface water sample data applied to the impaired assessment were collected over a number of years (1998-2007) and show that the river has a history, both upstream and downstream of elevated aluminum concentrations. The sampling for this assessment (as with all assessments) was based on random sampling (multiple samples) and assumes data represent average summer days. The criteria for "impaired status" is based on a minimum of two samples exhibiting a water quality exceedance, and not one individual grab sample. In this case, there were 12 downstream samples exceeding the water quality standard of 0.087 mg/L, and seven upstream samples at or above water quality standard.

Env-Wq 1703.03(a) states, "The presence of pollutants in surface water shall not justify further introduction of pollutants from point and/ or non-point sources." And Env-Wq 1708.01(a) states, "Existing instream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected;…." Therefore, when it is discovered, through sampling, that a surface water contains metals, nutrients, or other parameters in excess of NH water quality standards, NHDES determines that no additional loading to the surface water shall be allowed and, accordingly, that water quality limits must be imposed on discharges, without benefit of dilution, in order to preserve existing uses of that surface water.

Water quality limits in NH have historically been calculated using a background concentration of zero when the receiving water is not impaired, and thus, would have some assimilative capacity for dilution of excess pollutants in the effluent. This practice is not justifiable when the agency has data to show the receiving water exceeds water quality standards. In the case of the Merrimack River upstream of the Manchester WWTF, the 90^{th} percentile concentration of aluminum in the Merrimack River is 177 ug/L and the average concentration is 94 ug/L. The data clearly show the river contains aluminum concentrations higher than what is considered protective of aquatic life (87 ug/L). Using Manchester WWTF toxicity test data, the average concentration of aluminum is 84 ug/L and the 90^{th} percentile concentration of aluminum is 115 ug/L. Translating the 90^{th} percentile concentration and average concentration to mass loads, Manchester WWTF contributes as much as 32.6 pounds per day aluminum (or on average 23.8 pounds per day) to the Merrimack River. Because the river is impaired for aluminum, there is no assimilative capacity for mass loads of aluminum in excess of 24.7 pounds of aluminum (assuming the water quality standard of 87 ug/L). Therefore, Manchester's permit has a monthly average aluminum limit of 87 ug/l based on the freshwater chronic criterion in the State of New Hampshire Surface Water Quality Regulations applied at the point of discharge to the Merrimack without any allowance for dilution. A TMDL, if and when one is developed, could mean permit limits more stringent than the criteria in the state regulations. In the absence of a TMDL, the monthly average permit limit for aluminum is based on the freshwater chronic criterion.

Comment No. 2 : **PHOSPHORUS**

Phosphorus – Directive

Manchester is being asked to monitor phosphorus with three samples each week. Manchester believes this is an excessive amount of sampling and is requesting that this parameter be reduced to two/month, as is the case with aluminum.

At three samples per week, Manchester would generate 780 points of effluent analysis over a five-year permit period. At a twice/month rate Manchester would generate 120 points of effluent analysis.

The EPA and NHDES were very comfortable with coming up with conclusions and a proposed limit for aluminum based on 14 NHDES samples over a four-year period and nine effluent analyses from Manchester's effluent over two and one quarter years. This is a total of 23 samples to base permit conditions upon. The semi-monthly monitoring for phosphorus would be more than five times that used by EPA/NHDES to determine aluminum criteria.

Phosphorus – Fiscal Impact

Over five years the cost of the additional 660 samples ($13,200 @ $20 sample), there are also associated costs with travel to the NHDES to bring up samples in time to have them available for the DMR reporting. There is also the staff time to bring up the samples which means approximately 1.5 hours less work being done at the treatment plant each time a trip is made. It is anticipated that the fiscal impact to the plant would be in excess of $20,000 over the five-year period. Manchester believes this is an excessive cost to provide information above and beyond what is necessary, but still five times more than the information collected by the NHDES/EPA to base an aluminum limit upon.

Phosphorus – Resolution

Manchester would request that the phosphorus sampling be reduced to twice a month to coincide with the aluminum sampling to offset the $20,000+ in additional expense.

Response No. 2:

EPA concurs that number of phosphorus sampling events may be excessive. As a result, the monitoring requirements for phosphorus are reduced from 3/week to 2/month. The final permit is changed accordingly.

Comment No. 3: **MIMIMUM 85% REMOVAL CONDITION**

85% Removal – Directive

Page 6. Section A.4. This paragraph notes *"the permittee's treatment facility shall maintain a minimum of 85 percent removal of both total suspended solids and biochemical oxygen demand during dry weather."*

This requirement was waived under the previous permit.

85% Removal – Plant Operating Conditions

As noted in the Fact Sheet for the previous permit, the basis of the 85% removal requirement for TSS and BOD_5 (subsequently switched to $CBOD_5$ for Manchester) was based on a medium strength wastewater with a concentration of 200 mg/l for both constituents (15% of 200 mg/l = 30 mg/l which is the basis for the traditional 30/30 permit). It was noted in their previous permit that Manchester has weak wastewater loadings with an influent concentration that is well below 200 mg/l for these constituents.

The following is a table of the $CBOD_5$ and TSS concentrations in the WWTF influent from the period of January 1, 2004 to June 30, 2007 for these constituents for all days, days when any bypass flow was recorded, and days when the bypass was not operating. The calculated effluent concentration required to meet the 85% reduction requirements at these influent concentrations is also included in the below table for reference.

WWTF Influent TSS and $CBOD_5$ Concentrations and Required Effluent Concentrations Needed to Meet the 85% Removal Requirement (for the Period of 11/1/04 to 6/30/07)

	WWTF Influent TSS	**Effluent Required for 85% Removal**	**WWTF Influent $CBOD_5$**	**Effluent Required for 85% Removal**
All Days	162 mg/l	24.3 mg/l	106 mg/l	15.9 mg/l
Bypass Days	167 mg/l	25.1 mg/l	95 mg/l	14.3 mg/l
Non-Bypass Days	159 mg/l	23.9 mg/l	112 mg/l	16.8 mg/l

This table shows the average wastewater concentration for the WWTF influent. It should be noted that the above data presents averages and many of the data points for each category are significantly less than the average. These lower concentrations would make it extremely difficult for the Manchester WWTF to meet the 85% limits that are typically applied to wastewaters, with greater constituent concentrations.

It was noted that the draft permit is defining a dry weather day as a day in which there is less then 0.1 inch of rainfall and no snow melt. It is not clear how the WWTF is to quantify days in which snowmelt is occurring. Also, it has been established through the Combined Sewer Overflow studies that there is a base flow of perennial streams that enters the Manchester WWTP. This in essence creates a condition of continual wet weather flow conditions within the plant.

It should be noted that there are many days at the Manchester WWTF that the plant is in bypass mode with precipitation of less than 0.1 inch recorded (234 days of 830 total days where the bypass was activated). It should be noted that a significant number of these days have been shown to occur between early June and late August (there was only one such occurrence in July in the 3.5 year data set). Therefore it is unlikely that all of these bypass days with less than 0.1 inch of rainfall can be contributed to snowmelt and are likely due to elevated groundwater levels and associated stream flows.

Also there are a number of days that have precipitation greater or equal to 0.1 inch recorded where the WWTF did not go into a bypass mode (94 days of 307 total days). This is likely due to the WWTF operators being able to control the WWTF flow and use the collection system for storage to minimize the use of the bypass.

85% - Removal Resolution

Based on the reasons above, the City requests that consideration be given to extending the 85% removal waiver due to the difficulty of meeting the 85% removal rates at these average influent concentrations as well as months that have influent concentrations significantly less than the averages presented in the table. In addition if the 85% removal requirement is to remain, it is requested that the definition of a dry weather day be reexamined to address the concerns above.

Response No. 3:

Federal regulations at 40 CFR Part 133.103(a)(*Combined Sewers*) states "Treatment works subject to this part may not be capable of meeting the percent removal requirements established under 133.102(a)(3) and 133.102(b)(3), or 133.105(a) and 133.105(b)(3) during wet weather where the treatment works receive flows from combined sewers (i.e., sewers which are designed to transport both storm water and sanitary sewage). For such treatment works, the decision must be made on a case-by-case basis as to whether any attainable percentage removal level can be defined, and if so, what the level should be."

EPA Region I did waive the 85 percent removal requirement in the previous permit, but in the reissued permit made a case-by-case decision to require 85 percent removal under dry weather conditions. EPA has been including this condition in reissued permits to POTWs served by combined sewer systems, such as New Bedford and Lynn, Massachusetts to ensure proper operation of these treatment works and to ensure that

extraneous flows to the collection system other than storm water runoff are adequately controlled.

The following calculations from DMRs submitted for months which generally have dry weather show that the Manchester WWTF may achieve the proposed limit.

Date	Monthly Ave. Flow	CBOD		TSS	
	mgd	Influent lbs/day	Effluent lbs/day	Influent lbs/day	Effluent lbs/day
9/30/06	16.9	12,334	561	20,962	872
8/31/07	15.0	15,435	548	16,670	783
9/30/07	14.6	21,560	434	32,948	545

CBOD % Removal:

9/30/06 100 - 561/12,334 x 100 = 95%
8/31/07 100 - 548/15435 x 100 = 96%
9/30/07 100 - 434/21,560 x 100 = 98%

TSS % Removal:

9/30/06 100 - 872/20,962 x 100 = 96%
8/31/07 100 - 783/16,670 x 100 = 95%
9/30/07 100 - 545/32,948 x 100 = 98%

Based on the comments submitted by the City, it appears that high WWTP flows, on days there is no rainfall, are at least partially due to "the base flow of perennial streams that enters the Manchester WWTP". Removing such streams from the wastewater collection system should be a high priority for the City, and we understand that these flows are being removed pursuant to the City's CSO abatement program. The permit limit will ensure that these projects are completed.

Dry weather is defined as any calendar day on which there is less than 0.1 inch of rainfall and no snow melt. For the purposes of this requirement, a day with snow melt is defined as any day there is snow cover and the maximum air temperature exceeds 32 degrees Fahrenheit. Snow cover data may be found at http://lwf.ncdc.noaa.gov/oa/climate/research/snow/dly-data.php, and daily temperature data may be found at http://www.srh.noaa.gov/data/obhistory/KMHT.html.

Comment No. 4: **7Q10 OBSERVATIONS**

<u>7Q10 – Background</u>

The EPA/NHDES have set the 7Q10 parameter on supplied USGS Data. The Fact Sheet narrative (Page 8 of 33) states, *"Available dilution of the receiving water is determined using the facilities design flow and the annual 7-day mean low flow at the 10-year recurrence interval (7Q10) of the receiving water just above the facility's outfall."* The 7Q10 was set at 11.82 as the dilution factor. It was stated that data from 1941 through 2006 was used.

7Q10 – Review of 7Q10 Data Set

Attachment "A" contains the spread sheet and calculations provided by the NHDES. Each year's 7Q10 from 1943 through 2006 was used in determining 7-day mean low flow. The data was set up to consider rolling yearly 7Q10s. The resultant calculation from our review contained in Attachment "B" indicates a 7Q10 of 12.11792. Comments pertaining to our calculated 7Q10 are made on the bottom of the spreadsheet.

7Q10 – Resolution

Determine if Manchester's calculations are correct and change the permit allocation and subsequent calculations, or provide reasoning to demonstrate how the allocated dilution conforms with the narrative, *"Available dilution of the receiving water is determined using the facilities design flow and the annual 7-day mean low flow at the 10-year recurrence interval (7Q10) of the receiving water just above the facility's outfall."*

Response No. 4:

NHDES applied the same 7Q10 methodology to Manchester WWTF as is applied to all facilities being reissued permits. The 7Q10 value will not be changed, nor will the dilution factor. The following explains the 7Q10 methodology.

The 7Q10 value was derived using low flow frequency statistics which are based on the 7-day, 10-year frequency statistic of daily-mean flow. This statistic is the minimum consecutive 7-day mean streamflow expected to occur once in any 10-year period, or that has a probability of 1/10 of not being exceeded in any given year or season.

The annual series for the determination of low flow was based on a climatic water year from April 1 to March 31. In New Hampshire, the minimum 7Q mean discharge for most streams occurs in August or September (though it may occur in winter). The recurrence interval for an individual 7-day minimum mean flow is typically determined by fitting the 7-day minimum mean flows to a log-Pearson Type III distribution (Riggs, 1982). The log-Pearson Type III distribution relates the mean, standard deviation, and skewness of the logarithm of a flow statistic Y_g, to the logarithm of the value of that flow statistic with a particular exceedance or non-exceedence probability p, Y_{pg}. The Y_{pg} values are commonly expressed as the minimum 7-day mean discharge with an average recurrence interval of 10 years. The following equation describes the log Pearson Type III analysis:

$$\text{Log}(Y_{pg}) = E[\log(Y_g)]+K\{SK[\log(Y_g)], p\}* S([\log(Y_g)]),$$

Where

$Log(Y_{pg})$ is the logarithm of the Y-year low flow with a particular exceedance or nonexceedance probability,

$E[log(Y_g)]$ is the mean of the logarithm of the low flows,

$S([log(Y_g)$ is the standard deviation of the logarithm of the low flows, and

$K\{SK[log(Y_g)], p\}$ is a frequency factor that is a function of skewness of the logarithms of low-flow and exceedance probability.

Below is a copy of the spreadsheet that calculates the 7Q10 using the log-Pearson Type III distribution:

1Q Date	1Q	Log 1Q	Plotting Position	7Q Beginning Date	7Q	Log 7Q	Plotting Position
9/6/1937	450.00		#N/A	10/6/1937	1141.571		#N/A
9/5/1938	580.00		#N/A	9/5/1938	1725.714		#N/A
7/23/1939	426.00		#N/A	9/21/1939	963.143		#N/A
8/11/1940	617.00		#N/A	10/20/1940	1323.143		#N/A
7/6/1941	686.00		#N/A	9/25/1941	857.429		#N/A
10/4/1942	392.00	2.593286067	3.8	8/27/1942	1166.857	3.067017689	1.3
9/26/1943	529.00	2.723455672	2.3	9/25/1943	1248.429	3.096363699	1.2
9/10/1944	691.00	2.839478047	1.8	8/18/1944	1238.571	3.092921057	1.3
11/11/1945	910.00	2.959041392	1.2	8/23/1945	1695.714	3.229352679	1.0
7/7/1946	833.00	2.920645001	1.4	7/15/1946	1621.429	3.209897822	1.0
10/5/1947	348.00	2.541579244	5.0	10/22/1947	797.429	2.901691792	4.1
8/22/1948	217.00	2.336459734	13.0	9/28/1948	924.714	2.966007567	2.3
9/5/1949	154.00	2.187520721	21.7	7/4/1949	870.857	2.939946918	2.8
8/13/1950	180.00	2.255272505	16.3	8/13/1950	817.143	2.912297989	3.8
8/12/1951	1570.00	3.195899652	1.0	7/5/1951	2180.000	3.338456494	1.0
11/2/1952	363.00	2.559906625	4.6	10/27/1952	912.571	2.960266867	2.5
8/16/1953	312.00	2.494154594	5.9	9/7/1953	720.286	2.857504801	5.9
8/22/1954	630.00	2.799340549	1.9	8/24/1954	1280.714	3.107452254	1.2
7/17/1955	397.00	2.598790507	3.6	7/30/1955	962.429	2.983368507	2.1
8/19/1956	492.00	2.691965103	2.6	8/19/1956	1016.286	3.007015821	1.9
9/2/1957	147.00	2.167317335	32.5	9/1/1957	594.286	2.773995291	16.3
9/7/1958	259.00	2.413299764	7.2	9/1/1958	917.857	2.962775092	2.4
8/22/1959	248.00	2.394451681	9.3	9/25/1959	1010.286	3.004444212	2.0
9/5/1960	503.00	2.701567985	2.5	9/5/1960	1067.571	3.028396942	1.4
10/29/1961	412.00	2.614897216	3.4	10/28/1961	876.429	2.942716527	2.7
9/30/1962	372.00	2.57054294	4.3	7/3/1962	948.714	2.97713544	2.2
10/5/1963	291.00	2.463892989	6.5	10/8/1963	695.429	2.84225253	6.5
10/11/1964	98.00	1.991226076	65.0	9/25/1964	394.429	2.595968367	65.0
8/29/1965	244.00	2.387389826	10.8	8/3/1965	664.714	2.822635013	8.1
8/7/1966	375.00	2.574031268	4.1	8/3/1966	827.143	2.917580524	3.4
9/17/1967	974.00	2.988558957	1.1	9/22/1967	1061.429	3.025890774	1.5
9/1/1968	960.00	2.982271233	1.2	8/29/1968	1037.143	3.015838581	1.6

7/9/1969	463.00	2.665580991	2.8	7/6/1969	1169.714	3.068079794	1.3
9/13/1970	423.00	2.626340367	3.3	8/16/1970	850.000	2.929418926	3.1
8/25/1971	483.00	2.683947131	2.7	7/8/1971	742.857	2.870905304	5.4
9/15/1972	440.00	2.643452676	3.1	9/10/1972	1158.571	3.063922814	1.4
9/15/1973	621.00	2.7930916	2.0	9/10/1973	1294.429	3.11207809	1.2
8/17/1974	695.00	2.841984805	1.7	8/13/1974	861.571	2.935291288	3.0
8/29/1975	688.00	2.837588438	1.8	8/23/1975	1024.714	3.010602791	1.9
7/20/1976	906.00	2.957128198	1.3	7/19/1976	1338.000	3.126456113	1.1
9/12/1977	736.00	2.866877814	1.6	9/7/1977	969.429	2.986515815	2.0
9/23/1978	450.00	2.653212514	3.0	9/21/1978	742.857	2.870905304	5.4
7/14/1979	772.00	2.8876173	1.5	2/13/1980	1101.143	3.041843666	1.4
7/26/1980	517.00	2.713490543	2.4	7/24/1980	655.286	2.8164307	10.8
9/8/1981	1150.00	3.06069784	1.0	9/2/1981	1467.143	3.166472404	1.1
9/15/1982	822.00	2.914871818	1.4	9/13/1982	1030.571	3.013078098	1.7
9/20/1983	759.00	2.880241776	1.5	9/15/1983	819.714	2.913662504	3.6
9/21/1984	720.00	2.857332496	1.7	9/21/1984	836.143	2.922280484	3.3
8/19/1985	665.00	2.822821645	1.9	8/18/1985	777.429	2.890660497	4.3
9/20/1986	1060.00	3.025305865	1.1	9/11/1986	1545.714	3.189129221	1.1
8/26/1987	1030.00	3.012837225	1.1	8/21/1987	1045.714	3.019413041	1.6
10/7/1988	739.00	2.868644438	1.6	10/5/1988	911.000	2.959518377	2.6
9/14/1989	850.00	2.929418926	1.4	9/8/1989	1025.429	3.010905414	1.8
7/22/1990	784.00	2.894316063	1.5	7/17/1990	1046.286	3.019650296	1.5
8/3/1991	315.00	2.498310554	5.4	7/30/1991	436.000	2.639486489	32.5
10/9/1992	1090.00	3.037426498	1.0	9/16/1992	1360.000	3.133538908	1.1
7/24/1993	584.00	2.766412847	2.1	7/21/1993	657.857	2.818131595	9.3
8/17/1994	843.00	2.925827575	1.4	9/1/1994	1025.429	3.010905414	1.8
9/3/1995	250.00	2.397940009	8.1	9/2/1995	559.429	2.747744643	21.7
9/13/1996	870.00	2.939519253	1.3	9/9/1996	931.429	2.969149556	2.2
8/8/1997	889.00	2.948901761	1.3	9/25/1997	1088.857	3.036970904	1.4
9/3/1998	872.00	2.940516485	1.3	9/25/1998	1026.714	3.011449605	1.7
9/4/1999	598.00	2.776701184	2.0	9/2/1999	748.000	2.873901598	4.6
9/9/2000	1070.00	3.029383778	1.1	9/8/2000	1290.000	3.11058971	1.2
8/14/2001	582.00	2.764922985	2.2	9/14/2001	694.429	2.841627581	7.2
9/13/2002	538.00	2.730782276	2.2	9/9/2002	605.429	2.782062912	13.0
7/22/2003	917.00	2.962369336	1.2	7/6/2003	1049.857	3.021130207	1.5
8/11/2004	936.00	2.971275849	1.2	8/7/2004	1385.143	3.141494567	1.1
8/28/2005	1010.00	3.004321374	1.1	8/23/2005	1227.143	3.088895124	1.3
9/28/2006	1350.00		#N/A	9/23/2006	1442.857		#N/A
	n:	64			n:	64	
	Mean:	2.735588358			Mean:	2.980367047	
	Stdev:	0.249547386			Stdev:	0.134076535	
	Skewness:	-0.807442911			Skewness:	-0.259500175	

Ret. Per.	K	1Q
1.00010001	2.1729	1895.964
1.0101	1.7276	1467.906
1.25	0.8559	889.537
2	0.1332	587.252
5	-0.7792	347.653
10	-1.3366	**252.375**

Ret. Per.	K	7Q
1.00010001	3.1785	2549.924
1.0101	2.1340	1847.066
1.25	0.8515	1243.173
2	0.0432	968.625
5	-0.8265	740.554
10	-1.3060	**638.651**

20	-1.8406	188.917	20	-1.7151	562.871
25	-1.9950	172.879	25	-1.8366	542.160
50	-2.4563	132.622	50	-2.1900	486.120
100	-2.8959	103.018	100	-2.5151	439.699
200	-3.3190	80.785	200	-2.8186	400.363
500	-3.8587	59.246	500	-3.1943	356.523
1000	-4.2551	47.178	1000	-3.4629	328.148

Comment No. 5: **GENERAL OBSERVATIONS**

1. On page 4 of 19, the #3 and #2 footnotes are listed in reverse order.

2. Page 5 of 19, (13), lists chromium as a metal to be included in the test. The new EPA protocol has dropped this parameter as of January 2008. This fact is demonstrated in the Toxicity Test Procedure & Protocol attachment in the table of Section IV, Chemical Analysis. Chromium is not listed in that table. This metal should be removed from the narrative.

3. Attachment F shows the required Pretreatment Annual Report being due within 60 days of the effective date of the Permit. This would put the plant out of synch with the Annual requirement of August 1st of each year. Therefore, we request that we change this to August 1st.

4. Page 2 of 33 in the Fact Sheet first paragraph lists 17 Combined Sewer Overflows. Change that number to 13 to reflect all other permit language.

Response No. 5:

1. The footnotes #2 and #3 are corrected in the final permit.

2. Chromium is removed from the list of metals in the final permit.

3. EPA agrees and the Attachment F is changed accordingly.

4. EPA has noted your comment. EPA can not change the fact sheet. However, it **w**ill remain in the administrative file for future reference.

The following comments are received from the **Technical Assistance for Pollution Prevention Inc. (TAPP),** located at Chichester, New Hampshire.

Comment No. 1: Draft permit, page 2/19, under Whole Effluent Toxicity, add the following:

Total Recoverable Arsenic, mg/l	Report 1/Quarter	24-Hour Composite
Total Recoverable Mercury mg/l	Report 1/Quarter	24-Hour Composite

Reasons:

a. The Merrimack River is a public drinking water supply source river for downstream NH and Massachusetts cities. Arsenic and mercury are known carcinogens with extensive EPA-directed elimination programs in-place in New Hampshire and Massachusetts. The "Merrimack River above and below the MWTF has been identified as a mercury "hot spot". See "Mercury Contamination in the Forest and Freshwater EcoSystems in the Northeastern United States and Canada", Bioscience, January, 2007. Mercury will never be eliminated from the environment until sources are identified for removal. During 1999-2003, the NH Legislature directed comprehensive tests for mercury and arsenic, interalia, at NH POTWs and identified mercury and arsenic as significant toxics in effluent and sewage sludge. These annual tests continue in 2008.

b. NH Department of Environmental Services (NHDES) tests of waste water treatment plant's (WWTP) sewage sludge has detected significant amounts of mercury and arsenic in land applied and incinerated sludge (air transport) which can be deposited in the Merrimack River watershed and become available for leaching to the Merrimack River. Since activated sludge treatment plants remove 60% of available mercury and 45% of available arsenic, it is obvious that WWTP effluent can contain the remaining 40% of mercury and 55% of arsenic identified in sewage sludge measurements.

c. Testing for mercury and arsenic on a frequent, already-required other-toxic-metal-testing, basis costs no more than regular, required testing in the existing program and provides a "tracking" capability to determine the effectiveness of MWTP pollution prevention programs as well as providing long range data for determining if Merrimack River "hot spots" can be sourced to particular facilities. 40 CFR 122 requires the incorporation into NPDES permits of "any more stringent limitations, treatment standards, or schedule of compliance requirements established under Federal or State law or regulations...". In 1985, EPA stated "...the POTW or Approval Authority must identify other pollutants of concern (ed. Note: Other than the originally identified metals of concern - cadmium, chromium, copper, lead, nickel and zinc). 40 CFR 403, 40 CFR 503, NH Env-Ws 800 and NH Env-Ws 1700 all recognize arsenic and mercury as "pollutants of concern".

d. Further, EPA publication "Guidance Manual on the Development and Implementation of Local Discharge Limitations Under the Pretreatment program" (December 1987), states "POTWs should use toxicity based approaches and chemical-specific approaches involving applicable water quality standards or criteria in order to comply with such (regulatory) standards" (Pg. 2.2) and goes on to state "Even if there are no identifiable chemicals of concern in a POTW discharge, it is desirable to test effluents for toxicity (Pg. 2-30)".

e. EPA's Best Management Practices (40 CFR 125-100, Federal Register Vol. 64, No. 149, July 22, 1999, page 30590), clearly states the need to identify and control pollutants that are inimical to public health, such as those in POTW effluents; identifying and eliminating/reducing these pollutants is the purpose of Discharge Monitoring Requirements.

f. It is impossible to know if the toxicity values cited in 40 CFR 403, 40 CFR 503, NH Env-Ws 800 and NH Env-Ws 1700 are being met if no testing is done. Recent inquiries into the effectiveness of local pollution prevention programs and wastewater treatment processes can only be answered if quantitative values are determined and documented.

Response No. 1:

EPA agrees and recognizes arsenic and mercury as pollutants of concern. As part of the application process the permittee is required to submit effluent concentrations for all 120 priority pollutants. EPA reviews them for toxicity in the receiving water based on criteria and available dilution. The freshwater chronic and acute criteria for arsenic are 150 ug/l and 340 ug/l and the freshwater chronic and acute criteria for mercury are 0.77 ug/l and 1.4 ug/l. The receiving water has a dilution factor of 11.82 as stated in the fact sheet. Considering this dilution factor, the allowable chronic and acute concentration of arsenic are 1,773 ug/l and 4,018 ug/l and the allowable chronic and acute concentration of mercury are 9.1 ug/l and 16.5 ug/l. A review of the effluent data submitted in the NPDES permit application reveals that arsenic and mercury concentrations in the effluent are 10 ug/l and 0.9 ug/l respectively which are below the allowable concentrations of arsenic and mercury as calculated above. Therefore, no monitoring requirements are necessary.

Comment No. 2: Section C, Sludge Conditions, 2. Pollutant Limitations, Page 9/19.

The New Hampshire Mercury Reduction Strategy, October, 1998, NHDES (still valid), identifies 1997 NH sewage sludge incinerators as producing 1% of the total mercury emissions in NH. Since major mercury polluters such as the waste to energy plants, Penacook and Claremont NH; and PSNH, Bow, NH have reduced their mercury emissions by up to 83% (Manchester Union Leader, 8/5/08, Page B3), this means that sewage sludge incinerators are now producing a greater % of NH mercury emissions. It appears prudent to identify a maximum daily limit for mercury in this section.

Response No. 2:

See Part I.C.2.c. of the permit for a limit of 8,573 mg/kg arsenic in the sewage sludge fed to the incinerator. See Part I.C.2.b. of the permit for a limit of 3200 gm per 24-hour period emission for mercury.

Comment No. 3: Attachment A. Freshwater Chronic Toxicity Test Procedure and Protocol, USEPA Region 1, VI, Page 4, add the following:

Metal	Effluent	Receiving Water	Minimum QuantificationLevel(mg/l)
As	x	x	0.005
Hg	x	x	0.0025

Response No. 3:

There is no need to include monitoring requirements for arsenic and mercury under the chemical analysis portion of the toxicity test. See comment and response No.1 above.

Comment No. 4: Fact Sheet, Section D. Metals Monitoring, 4th paragraph, pg. 9 of 33,which reads "The current permit has a monitoring requirement for silver..... the monitoring requirements for silver have been removed from the permit".

Recommendation: Remove this paragraph and retain the silver monitoring requirement in the permit.

Reason: Recent advances in nanotechnology are providing silver nanotubes which are being used in clothing materials, washing materials, clothes dryers, food containers, toys and personal care products, inter alia. The International Center for Technology Assessment has requested EPA to regulate nanosilver as a pesticide (see "EPA Urged to Act on Nanosilver", Chemical Engineering News, May 22, 2008, pg. 30). Also pertinent are articles (1) "Nano particles in fabrics: weave of destruction", Electronic Engineering Times, pg. 4, April 14, 2008, (2) " Nano Technology - Nanotech-enabled Textile Materials", Vacuum Technology and Coating, pg. 28-32, May, 2008, and (3) "nanotech Silver Stops Microbes", Product Finishing, pg. 18-21, September, 2007. It is probable that **nanotech silver will be appearing in commercial, industrial and household wastewater; wastewater treatment facilities should be monitoring this likely event.**

Response No. 4:

There is no reasonable potential for toxicity as stated in the fact sheet. As a result, no monitoring requirement for silver is necessary.

Comment No. 5: Fact Sheet, Section V. Endangered Species.

Pg. 24 of 33. On July 9, 2008, the NH Fish and Game Department held a public hearing to consider adding Atlantic salmon (sea run) to the State endangered species list. This supports a Fish and Game program that raises Atlantic salmon fry to stock in NH streams that feed the Merrimack River. The Section V, Essential Fish Habitat and Endangered Species discussion (page 23) states "Spawning, breeding, feeding or growth to maturity" covers all habitat types utilized by a species throughout its life cycle. Obviously the Merrimack River from Manchester, NH downstream to the Gulf of Maine, including the portion used for effluent release by the MWTP, is essential fish habitat as defined by the National Marine Fisheries Service and should be so addressed if and when Alantic salmon (sea run) becomes a documented NH endangered species; pH, inter alia, is of major concern. The permit should note this possibility.

Response No. 5:

We have noted your comments.

Other Comment:

EPA has included a notification requirement for down stream water supply communities of any emergency condition, plant upset, bypass, CSO discharge or other system failure.