

Chapter 4

Long Term Monitoring Plan Guidance

Section A. Quick Reference Info

1. **Definition** - Long Term Monitoring Plan for gathering data for a site-specific Headworks Analysis.
2. **Acronyms**
 - HWA - Headworks Analysis
 - LTMP - Long Term Monitoring Plan
 - PCI - Pretreatment Compliance Inspection
 - POC - Pollutant of Concern
 - POTW - Publicly Owned Treatment Works
 - SIU's - Significant Industrial Users
 - STMP - Short Term Monitoring Plan for Modified Programs
 - WWTP - Wastewater Treatment Plant
3. **Purpose:** To gather POTW data for completion of a site-specific headworks analysis. This data is to be collected over an extended period and as such is considered "long term". (For modified pretreatment programs, the sampling may be reduced to "short term".)
4. **Regulatory References**
 - 40 CFR 403.5(c)-specific limits.
 - 40 CFR 122.21(j)-written technical evaluation
 - 15A NCAC 2H .0905, .0906, .0907
 - NPDES Permit language (Part III).
 - Non-Discharge Permit language.
5. **DEM Requirement**
 - LTMP plan to be submitted per NPDES requirement.
 - All LTMP data to be collected per 40 CFR 136 and analyzed by a DEM Certified Laboratory that is certified for the applicable pollutant.
 - All LTMP data to be submitted with headworks analysis.
 - LTMP effluent data to be reported on Discharge Monitoring Report (DMR).
 - For Modified Pretreatment Programs, implement a STMP.
6. **Implementation Frequency**
 - Submit LTMP by July 1, 1994 and Implement LTMP by October 1, 1994, or earlier if required in NPDES permit.
 - Submit STMP and implement as required by Division.
 - Continuous implementation thereafter.
 - Modify LTMP or STMP as needed with prior Division approval.

Chapter 4 Long Term Monitoring Plan Guidance

Section A. Quick Reference Info

7. Appendices

- Appendix 4-A, LTMP Model (Activated Sludge / Aerobic Digester WWTP).
- Appendix 4-B, Example LTMP Summary Data Form.
- Appendix 4-C, Modified Program STMP Model (Activated Sludge / Aerobic Digester WWTP).
- Appendix 4-D, Modified Program STMP Model (Lagoon WWTP With Land Application of Effluent (Spray Field/Irrigation)).

- Other Guidance Documents
 - *Guidance Manual on the Development and Implementation of Local Discharge Limitations Under the Pretreatment Program*, (1987), NTIS #PB92-129188
 - *Supplemental Manual on the Development and Implementation of Local Discharge Limitations Under the Pretreatment Program*, (1991), [Residential and Commercial Toxic Pollutant Loadings and POTW Removal Efficiency Estimation], (21W-4002)

Section B. Discussion

Federal regulations (40 CFR 122.21(j)) require POTW's that are subject to pretreatment regulations to submit a written technical evaluation of the need to revise their local limits that have been established per 40 CFR 403.5(c)(1). North Carolina has interpreted these Federal Requirements to require that POTWs must submit headworks analyses based on site-specific data. This data must characterize the WWTP process efficiency, the WWTP inhibition thresholds, and the POTW users. The Long Term Monitoring Plan is the plan to collect on a continual basis the site-specific data necessary for the continual updating of the headworks analysis.

Chapter 4 Long Term Monitoring Plan Guidance

Section C. How to

A well designed LTMP must answer several questions, including:

- "Which pollutants to monitor for?",
- "Where to sample?",
- "When and how often to monitor?", and
- "How should it be sampled and analyzed?".

To aid you in designing your LTMP the Division has developed a Division LTMP model (Appendix 4-A) which demonstrates minimum plan requirements and a format for plan submittal to the Division.

Which pollutants to monitor for? (POC's)

EPA defines POCs as any pollutant which might reasonably be expected to be discharged to the POTW in quantities which could pass through or interfere with the POTW, contaminate the sludge, or jeopardize POTW worker safety and health. For purposes of the LTMP and HWA, the minimum POC list includes the following:

- Pollutants limited in the POTW's NPDES permit; and
- Pollutants limited in the POTW's sludge disposal permit, Sludge to Disposal Percent Solids, and Sludge to Disposal Flow.
 - Land Application subject to 40CFR503; the POC's are Arsenic, Cadmium, Chromium, Copper, Lead, Mercury, Molybdenum, Nickel, Selenium, Zinc, Sludge to Disposal Percent Solids, and Sludge to Disposal Flow; and
- EPA required: Cadmium, Chromium, Copper, Nickel, Lead, and Zinc; and
- Pollutants limited in SIU permits with the exception of the organic pollutants. For the organic pollutants a "default HWA" will be allowed (See the HWA Chapter for details); however, periodic sampling for the organic pollutants may be conducted to confirm the default removal rates used for the HWA.
- LTMP Pollutant **exceptions** - the following pollutants are not generally considered to be POC's: as they cannot be evaluated using standard HWA techniques: DO, pH, Temperature, conductivity, Oil & Grease, fecal coliform, aquatic toxicity, and TTO. If the POTW has difficulty in attaining compliance with these NPDES limits then a specialized monitoring program must be established.
- The POC's Fluoride, COD, and CBOD are discussed in the Section E. Special Case Discussions.
- It is **recommended** that the POTW consider the following additional POC's:
 - Pollutants monitored in the NPDES permits. (These pollutants have a high probability of becoming NPDES limited.)
 - Pollutants listed in the POTW's Sewer Use Ordinance. (Users may challenge the technical validity of a default HWA for limited pollutants.)
 - Pollutants monitored in the SIU permits. (SIU's may challenge sampling costs of monitored pollutants if not supported by site-specific HWA.)
 - Pollutants limited or monitored in local permits. (To provide support for local permit as opposed to SIU permit.)
 - Any pollutants of concern to your facility. (For your own information.)
- It must be noted that if a POTW has NPDES compliance problems, the Division may require additional POC's to be monitored.

Chapter 4

Long Term Monitoring Plan Guidance

Section C. How to

Where to sample and when to monitor? (Sampling Points and Frequencies)

- **Uncontrollables**
 - The minimum requirement is a derived uncontrollable load, the "Uncontrollable Load Mass Balance Method". The "Uncontrollable Load Mass Balance Method" derives the uncontrollable by subtracting the average total SIU load from the average influent load. The average total SIU load is the sum of the individual average SIU flow multiplied by the respective SIU pollutant concentration. The average influent load is the average influent flow multiplied by the average influent pollutant concentration. This method is discussed in more detail in Chapter 5 Section E.
 - The recommendation is that some (a couple of times per year) representative uncontrollable sampling be completed to support the calculated values. If the POTW chooses to monitor actual uncontrollable sources to determine its uncontrollable loading, then it is recommended that sampling include a minimum of six times per year at multiple sites.
 - If the facility has NPDES compliance problems, then a systematic trunkline monitoring program is recommended.

- **SIU**
 - The minimum requirement is per the SIU permit.
 - The recommendation is that all POC's be measured at least once per year. By measuring all POC's at SIU's, Controllable pollutant loadings will be more accurate. With a more accurate Controllable pollutant loading, the calculated uncontrollable loading will be more accurate. You may wish to add this monitoring to the Industrial User Pretreatment Permit as industry monitoring.

- **WWTP** - Data from WWTP sites will be used to determine pollutant removal efficiencies, to determine plant inhibition thresholds, and in the calculation of uncontrollable loadings.
 - Influent prior to recycle streams(REQUIRED) - This data is very important as it will be used for determination both of removal efficiencies and uncontrollable loadings.
 - Post-disinfection effluent(REQUIRED) - This data will be used to determine removal efficiencies.
 - Internal to bioprocess(REQUIRED) - To provide site-specific inhibition thresholds a sampling point in the biological process unit is recommended. For instance for an activated sludge plant the typical sampling point would be at a midpoint of the basin. It must be noted that the Division has approved headworks analysis site-specific inhibition thresholds based on the maximum influent concentration, on the maximum bioprocess concentration, and on pilot plant inhibition studies.
 - Influent to or Internal to anaerobic digester(RECOMMENDED) - Per EPA data inhibition may occur in the anaerobic digester. Influent data taken prior to the anaerobic digester and data taken internal to anaerobic digester may be used to establish site-specific anaerobic digester inhibition values.

Chapter 4 Long Term Monitoring Plan Guidance

Section C. How to

- **Influent and Effluent Sampling Frequency**
 - If HWA within 6 months and no previous LTMP data collected, 10 work days for initial data, then quarterly monitoring on a workday.
 - Otherwise, monthly monitoring on a workday for the first year, then quarterly monitoring on a workday.
 - The monthly and quarterly monitoring requirement has been instituted to allow the effluent sampling to coincide with NPDES sampling requirements. The monthly and quarterly requirement is considered less stringent than the previous 3 consecutive days per quarter. As such, the POTW may make this frequency change immediately without notice to the Division. Please modify your LTMP and submit these changes when the POTW makes other changes to the LTMP. Other changes to the LTMP must have prior Division approval.
 - The Division recommends that the frequency be increased to monthly for the 12 month period prior to completing a headworks analysis. The more recent data may be a good indicator of the current plant operating performance.
- **Internal to Bioprocess Sampling Frequency**
 - Once per six months to establish typical activated sludge basin pollutant concentrations during which the biological processes have not been inhibited. Effluent BOD data from the sampling period is needed to support that the carbonaceous biological processes have not been inhibited. Effluent ammonia data from the sampling period is needed to support that nitrogenous biological processes have not been inhibited.
- **Sludge(Residuals)**
 - Sludge to Disposal monitoring must be accomplished in accordance with the Division approved sludge (residuals) permit and in accordance with 40 CFR 503 monitoring requirements for those facilities with Land Application. The 40 CFR 503 sampling frequency requirements are as follows:

<u>Residuals Amounts</u> <u>(dry metric tons per year)</u>	<u>Monitoring Frequency</u>
> 0 but < 290	annually
>= 290 but < 1,500	quarterly
>= 1,500 but < 15,000	every 60 days
>= 15,000	monthly
 - The pollutants limited by annual and cumulative application rate limits have been added to the POC list.
 - Anaerobic Digester - for completion of the anaerobic digester inhibition evaluation, the waste flow to digester is necessary. It is required that a method for establishing waste flow to anaerobic digester be established.
- It must be noted that if a POTW has NPDES compliance problems, the Division may require additional sampling sites.

Chapter 4 Long Term Monitoring Plan Guidance

Section C. How to

How should it be sampled and analyzed? (Sampling Method)

- In order to maintain the maximum technical validity/legal defensibility, LTMP sampling, preservation and analytical methods should be gathered and analyzed per 40 CFR 136 methods. Departures from 40 CFR 136 Methods must have prior Division approval.
- Detection levels will generally have to be the lowest technologically available in order to gather data above detection levels. Appendix 4-A includes a partial list of the currently accepted minimum detection levels. However, if substantial monitoring of the LTMP locations consistently indicate pollutant concentrations above the detection level of a less sensitive analytical method, then there is no need to continue to run the lowest detection level analysis.
- Appendix 4-A also lists the appropriate sample type, composite or grab. Where possible flow proportional composites should be taken, when flow proportional composites cannot be taken, timed composites should be taken at the maximum feasible frequency.
- Hydraulic Retention Time. The Division recommends that the WWTP sampling be conducted to account for hydraulic retention time. For example, if the plant has a hydraulic retention time of 24 hours, then the influent sampling would begin and end 24 hours prior to the effluent sampling. It is thought that by staggering the sampling according to hydraulic retention time the effluent concentration measured will be more closely related to the influent concentration measured than influent and effluent concentrations measured concurrently.

Chapter 4

Long Term Monitoring Plan Guidance

Section D. Recording and Reporting Data

The data will be gathered continually and will become a large data set to manage. With a large volume of data, a recording system for data will be necessary to prevent loss of data.

- Appendix 4-B is a suggested LTMP summary recording form. It is recommended that the data be transferred to this summary recording form (or to a similar form of the POTW's design) when it is returned from the lab. The lab data sheets should be maintained for the rare case when the summary recording forms are misplaced or must be checked.
- The summary recording form for the LTMP is required to be submitted with the HWA. Also, the Division will review copies of LTMP summary reporting forms and lab data sheets at inspections and audits.

Chapter 4 Long Term Monitoring Plan Guidance

Section E. Special Case Discussions

- To develop a headworks analysis for COD or CBOD it is recommended that COD or CBOD monitoring be completed at the same time as BOD monitoring. This monitoring will establish a COD/CBOD/BOD ratio. From this ratio, the COD, CBOD, or BOD can be linked to the NPDES limited pollutant.
- Fluoride is not a Pollutant of Concern unless Fluoride is included in an SIU permit. As "Fluoride is expected to be in the wastewater treatment plant's discharge primarily due to its addition at the water treatment plant, but its concentration is expected to be less than the 1.8 mg/l limit . As such, the Division has developed a fluoride LTMP procedure, as follows:

"For POTWs without permitted fluoride industrial discharges, inclusion of fluoride in the LTMP is not required; however, if effluent monitoring indicates fluoride concentrations greater than 1.5 mg/l then a fluoride source identification plan involving minimal monitoring must be implemented."

The minimum source identification plan would include a review of water treatment plant fluoride concentrations and 3 consecutive days of trunkline monitoring, or 3 consecutive days of SIU monitoring. This plan would not be considered complete until the source is identified and controlled. It must also be noted that elevated fluoride effluent concentrations have been attributed to inadequate water treatment plant fluoride control, a few industrial user process discharges (for instance, coil-coating/can making or semiconductor manufacture), and the concentrating of the water supply in recycle systems."

Chapter 4 Long Term Monitoring Plan Guidance

Section F. Modified Programs Short Term Monitoring Plans

After proposed amendments are adopted, 15A NCAC 2H .0904 may allow a POTW to develop a Modified Pretreatment Program with approval of the Director of the Division. The modified pretreatment programs would be smaller POTW's with few industries and would have reduced pretreatment program implementation requirements. In this case, the complete sampling regimen of the LTMP will not typically be required of the Modified Pretreatment Program POTW. Instead, the Modified Pretreatment Program POTW will be required to develop and implement a Short Term Monitoring Plan (STMP). It must be noted that if a Modified Pretreatment Program has NPDES compliance problems, then the Division may require development and implementation of a LTMP. Also, if a Modified Pretreatment Program POTW continues to implement a current approved LTMP, then the STMP requirement will be waived.

STMP Monitoring Frequency. The STMP has identical sampling requirements as the LTMP with the exception of monitoring frequency. For the STMP, in the year prior to the headworks analysis being completed, the POTW will sample the influent and effluent for 4 consecutive workdays, (Monday - Thursday) and internal to bioprocess once. The sludge to disposal and SIU monitoring will be completed at a minimum as required by the respective permits. A model STMP has been developed and is provided in Appendix 4-C.

STMP Reporting. STMP data should be reported on a summary reporting form, similar to the reporting form provided in Appendix 4-B. The summary recording form for the STMP is required to be submitted for preparation of the HWA.

Additional Sampling. A POTW may conduct by their choice sampling in addition to the sampling required in their STMP. This sampling may be beneficial for the POTW for process control purposes and to check for user discharge and influent changes.

STMP Submission. For a modified POTW with an approved current LTMP, the POTW only needs to submit a revised sampling frequency chart, (See Appendix 4-C Part F. of STMP Model for an example) . For a modified POTW without an approved and current LTMP, the POTW must submit a complete STMP, (See Appendix 4-C for an example).

Non-Discharge POTWs. POTWs with Non-Discharge permits (i.e. effluent spray irrigation facilities) should see Section 4-G and Appendix 4-D.

Chapter 4 Long Term Monitoring Plan Guidance

Section G. "How to" for Non-Discharge WWTP STMPs

This section addresses STMPs for Non-Discharge WWTPs. As discussed in Section F, smaller POTWs qualify to develop a Modified Pretreatment Program, which requires a STMP, rather than a LTMP to gather data to perform the HWA. As further discussed in Section F., the STMP is essentially the same as the LTMP (described in Sections C., D., and E.), with the exception of monitoring frequencies. This section addresses STMP requirements for Non-Discharge WWTPs with a Lagoon WWTP. The differences in the Non-Discharge STMP reflect the differences between the Non-Discharge Permit requirements as compared to NPDES Permit requirements, as well as the differences between Lagoon WWTPs and Activated Sludge WWTPs.

To determine if your Non-Discharge POTW qualifies for a Modified program, please contact your Division Pretreatment Contact for guidance. Also, if a Non-Discharge POTW that develops a Modified Pretreatment Program POTW wishes to implement a Non-Discharge LTMP rather than a STMP, please contact your Division Pretreatment Contact for guidance. Likewise, Non-Discharge POTWs that do not qualify to develop a Modified Program should contact your Division Pretreatment Contact for guidance on development of a Non-Discharge LTMP.

Non-Discharge STMP Submission. All Modified Program Non-Discharge POTW's must submit a complete Non-Discharge STMP, even if they are currently implementing an approved LTMP. To aid you in designing a Non-Discharge STMP, the Division has developed a Division Non-Discharge STMP model (Appendix 4-D) which demonstrates minimum plan requirements and a format for submittal to the Division. The Non-Discharge STMP design criteria are discussed below.

What pollutants to monitor for? - Non-Discharge STMP Pollutants of Concern (POCs)

EPA defines a POC as any pollutant which might reasonably be expected to be discharged to the POTW in quantities which could pass through or interfere with the POTW, contaminate the sludge, or jeopardize POTW worker safety and health. For purposes of the Non-Discharge STMP and HWA, the minimum POC list for Non-Discharge pretreatment programs includes the following:

- EPA required: Cadmium, Chromium, Copper, Nickel, Lead, and Zinc; and
- Pollutants for which effluent monitoring is required in the POTW's Non-Discharge Permit; and
- Pollutants the WWTP was designed to treat (ex., BOD, TSS, NH₃ as N); and
- For WWTPs that do generate sufficient solids to require routine disposal - same as LTMP (see Section C.)
- For WWTPs that do not generate sufficient solids to require routine disposal: Arsenic, Cadmium, Chromium, Copper, Lead, Mercury, Molybdenum, Nickel, Selenium, Zinc; and
- Pollutants limited in SIU permits with the exception of the organic pollutants. For the organic pollutants, please contact your Division Pretreatment Contact for guidance.
- LTMP Pollutant exceptions - same as LTMP (see Section C.).
- The POCs Fluoride, COD, and CBOD - same as LTMP (see Section C.).

Chapter 4 Long Term Monitoring Plan Guidance

Section G. "How to" for Non-Discharge WWTP STMPs

- **Recommended POCs** - same as LTMP (see Section C.), with the following addition:
 - Pollutants for which groundwater or soils monitoring is required in the POTW's Non-Discharge Permit.
- It must be noted that if a POTW has Non-Discharge Permit compliance problems, the Division may require additional POCs to be monitored.

Where to sample? - Non-Discharge STMP Sampling Points

- **Uncontrollables** - same as LTMP (see Section C.).
- **SIU** - same as LTMP (see Section C.).
- **WWTP** -
 - **Influent prior to recycle streams** - This data is very important as it will be used for determination both of removal efficiencies and uncontrollable loadings.
 - **Post-disinfection effluent** - This data will be used to determine removal efficiencies.
 - The Division does not recommend that the influent and effluent sampling be conducted to account for hydraulic retention time as this is typically 30 to 90 days.
 - Internal to Lagoon is not required as inhibition of the lagoon will not be evaluated. Please see Chapter 5, Section J, for more discussion.
- **Sludge (Residuals) - Sludge to Disposal**
 - For WWTPs that do generate sufficient solids to require routine disposal - same as LTMP (see Section C.).
- **Sludge (Residuals) - Sludge Blanket**
 - For WWTPs that do not generate sufficient solids to require routine disposal, sample the sludge blanket once during the year before an HWA must be performed, unless it has been sampled in the last year. Data from this site will be used to determine how the metals levels compare to regulatory disposal levels (40 CFR 503 and other sludge regulations, hazardous waste regulations) for planning purposes. It is recommended that a composite of 5-10 grab samples of the sludge blanket taken at random locations in the lagoon should be collected as a representative sample of the sludge blanket. The pollutants of concern for this location are those currently regulated by 40 CFR 503 for land application of sludge. The results of this sample will then be evaluated by the POTW to determine if additional monitoring is needed. If levels exceed sludge ceiling concentrations, annual monitoring at this location will be required.
- **Groundwater Monitoring Wells**
 - For WWTPs that wish to perform passthrough headworks analysis calculations using NC Groundwater Quality Standards, and wish to get credit for the removal of metals or other pollutants in performing those calculations, groundwater monitoring wells must be included in the Non-Discharge STMP. For more information, please see Section J of Chapter 5, and contact the Pretreatment Group for a case-by-case-discussion.
- It must be noted that if a POTW has Non-Discharge Permit compliance problems, the Division may require additional sampling sites.

Chapter 4 Long Term Monitoring Plan Guidance

Section G. "How to" for Non-Discharge WWTP STMPs

How often to sample? - Non-Discharge STMP Monitoring Frequency.

- **Influent and Effluent:**

In the year prior to the headworks analysis being completed, the POTW must sample the influent at the same time the POTW performs the effluent monitoring required by the Non-Discharge Permit (typically 3 samples per year), on a workday. This influent/effluent monitoring requirement has been instituted to allow the effluent sampling to coincide with Non-Discharge Permit sampling requirements.

- **Sludge:**

If no routine sludge removal, the sludge blanket must be sampled once during the year before an HWA is to be performed. If there is routine sludge removal, the sludge to disposal monitoring will be completed at a minimum as required by the 40 CFR 503 and the POTW's sludge disposal permit.

- **SIU:**

SIU monitoring will be completed at a minimum as required by the respective permits.

STMP Reporting. STMP data should be reported on a summary reporting form, similar to the reporting form provided in Appendix 4-B. The summary recording form for the STMP is required to be submitted for preparation of the HWA.

Additional Sampling. A POTW may choose to conduct sampling in addition to the sampling required in their Non-Discharge STMP. This sampling may be beneficial for the POTW for process control purposes and to check for user discharge and influent changes.