CHAPTER 1.3 - Representative Data, Reasonable Potential & WET Monitoring

This chapter includes guidance regarding the use of WET data & facility-specific information to make decisions regarding WET monitoring and limitations, including how to use the WET Checklist.

NOTICE: This chapter and the associated SWAMP WET Checklist are intended solely as guidance, and do not contain any mandatory requirements except where requirements found in statute or administrative rule are referenced. This guidance does not establish or affect legal rights or obligations, and is not finally determinative of any of the issues addressed. This guidance does not create any rights enforceable by any party in litigation with the State of Wisconsin or the Department of Natural Resources. Any regulatory decisions made by the Department of Natural Resources in any matter addressed by this guidance will be made by applying the governing statutes and administrative rules to the relevant facts.

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STAFF RESPONSIBLE FOR WET DETERMINATIONS

In order to insure consistent and efficient decision making and in order to be able to describe the whole effluent toxicity (WET) determination process in this guidance, it is necessary to include recommendations that identify which WDNR staff should be making decisions regarding WET requirements. In order to make good decisions, the person responsible for making WET determinations needs to be familiar with receiving water and effluent conditions, WQBEL recommendations, and other site-specific information, or be able to easily obtain it (have access to field staff with this knowledge). In order to make the best informed decisions possible, it is necessary for WQBEL and WET determinations to be made via a collaborative effort with permit coordinator, basin engineer/specialist, and WQBEL staff. In most cases, WQBEL staff should make WET determinations by completing the Checklist during the development of other WQBEL recommendations, with basin engineer/permit coordinator input. Once complete, the WET Checklist is provided to permit staff for use when determining necessary WET permit requirements.

MAKING WET DETERMINATIONS

It is very important that decisions about WET monitoring and limits be made using data that is representative of the discharge being evaluated. Pages 2-5 of this chapter include criteria Department staff should use as they review WET data prior to making decisions on the need for monitoring and limits. Guidance on pages 5-29 gives examples and discusses WET limits and monitoring frequencies.

Staff responsible for making decisions regarding WET requirements should complete the following steps:

Step 1: Collect and summarize all WET data and other related information (see "*Step 1 - Data Collection and Summarization*" section below),

Step 2: Select WET data which is representative of the discharge being evaluated (see "*Step 2 - Selecting Representative Data*" section below, pp. 2-5), and

Step 3: Complete the WET Checklist (see "*Step 3 - Determination of Monitoring Frequency and Need for a Limit*" section below, pp. 5-29) to determine the monitoring frequency and the need for WET limits. If evaluating a minor municipal facility (<1.0 MGD), staff may first complete the "quick check" described in Chapter 1.11 (http://dnr.wi.gov/topic/wastewater/documents/Chap1x11MinorMunicipalStrategy.pdf) to determine whether a more in-depth analysis via the WET Checklist is even necessary.

The guidance in this chapter is intended to apply in most situations, but there may be situations where the general assumptions it is based on may not apply and deviations from the suggested criteria will be necessary. **Decisions that are made contrary to the guidance suggested here should be shared with the Biomonitoring Coordinator and clearly documented, so others can tell why decisions were made.** Specific examples and reasons for deviating from WET Checklist recommendations are given on pages 29-32.

Step 1 - Data Collection and Summarization

At the time of WET evaluation, all available WET data should be collected and summarized. WET Database reports summarize WET data for visual review of results and comparison to other effluent data. Since Database reports include only summaries, manual retrieval of hard copy reports may be required in some cases. More detailed WET files are kept in the central office, therefore, a call to the Biomonitoring Coordinator may be helpful when questions arise. It should also be noted that there may be a delay between report submittal and data entry into SWAMP. A call to the Biomonitoring Coordinator or permittee could be useful when determining if the Database contains results from all tests. For instructions on generating WET Database reports, staff should read the user documentation on the watershed file directory at W:\SWAMP\SWAMP User Manual\WET_Database.doc.

Only WET data with firm documentation of data quality problems should be eliminated from the data set at this stage in the process. This may be the best point in the process to deal with suspicious-looking data. WET Database reports should include comments noting when problems have occurred or if results are questionable (see discussion of "Qualified Data" below in the next section). A quick call or email to the Biomonitoring Coordinator to verify the appropriateness of using such data could make things go more smoothly later on. If the information is readily available, it may be useful to consult other effluent data when making decisions regarding the representativeness of WET data. For instance, flow data and results of conventional pollutant testing may be an indicator of abnormal treatment plant operations. It may also be helpful to compare WET results with other effluent data to look for similar trends. **Staff should clearly indicate which data was used in RPF calculations and discuss reasons for any changes made to data sets in the WQBEL memo, so that others can tell why decisions were made.**

Step 2 - Selecting Representative Data

It is very important that decisions about WET monitoring and limits are made based on data that is representative of the discharge being evaluated. Once all valid WET data have been compiled, additional screening of the data may be necessary. So far, only data that have been shown to be clearly flawed have been screened out. Now, however, additional decisions can be made based on the complete body of data and other factors. When making WET determinations according to the criteria in this guidance, staff must remember that all data are not automatically representative of the discharge being evaluated. If it is determined that representative data are not available, the Department should rely on additional WET monitoring in most cases and should not be bound to setting WET limits in the permit. When there is doubt regarding the representativeness of one or a few data points, additional WET data may clarify the representativeness of those data. When representativeness of existing data is questionable, more experienced permittees (or those helped along by supportive Department staff) will conduct additional tests when faced with positive results that they know may trigger a limit.

Data quality. The Department uses the WET laboratory certification program, communication with labs and permittees, and staff and external customer training strategies to insure WET data quality. Data quality can be a complex issue and is determined for each test by the Biomonitoring Coordinator during the test report review process (see Chapter 1.5 at http://dnr.wi.gov/topic/wastewater/documents/Chap1x5WETDataInterp.pdf for more details on data review). If data quality is questionable at the time of report review, a note is placed on the test report form and is noted in the WET Database. Tests with poor data quality are usually easily identified on reports from the WET Database, however, it may be necessary to check hard copies of report forms (which are kept in permit and WET files for the facility) or talk with the Biomonitoring Coordinator.

Representativeness. Following is a list of considerations when selecting representative data. For many of these, staff may have to rely on the permittee to know whether there is a potential problem. For others, staff may have to dig a little deeper if things don't seem right. ***Always be sure to document reasons for any changes made to data sets.***

1. **Qualified Data**. There may be notes in the WET Database concerning QA concerns or unusual circumstances at the time of sampling. In many cases when test acceptability concerns are noted, it may be appropriate to exclude the test from the data set. Tests completed during upset conditions may be excluded if it is determined that conditions were not representative of normal effluent conditions. However, we should not reward recurrent plant upsets. Staff should judge whether the problem regularly occurs or is due to poor operation. If regular upsets or poor operation represents normal conditions, the data should be used in making WET monitoring and limits decisions.

   Occasionally, tests must be repeated due to poor QA. When this happens, usually only the unacceptable portions of the test are repeated. Tests done under these conditions shouldn't be double-counted. For example, suppose a test was completed with *C. dubia* and the fathead minnow (fhm). The fhm portion was unacceptable, so that portion had to be repeated. The original test (with acceptable *C. dubia* results) and the repeated test (with acceptable fhm results) should be counted as one complete test. (Only 1 value, that of the most sensitive species, should be used in Reasonable Potential Factor calculations).

2. **Laboratory capabilities and sample integrity.** Lab performance, results of recent laboratory audits, and sample quality may need to be considered when deciding whether to include WET data in RPF determinations. All WDNR certified WET labs are audited regularly (on a ~3 year cycle) and audit reports are available. Any evidence of improper sample collection, preservation, or holding times should be considered (test results with these problems may have to be discarded). Tests done by labs not certified or registered according to ch. NR 149, Wis. Adm. Code, are not acceptable for determining permit compliance.

   A list of certified WET labs can be found at: http://dnr.wi.gov/topic/wastewater/WETCertified.html

3. **"Inconclusive" tests.** Tests may be labeled "inconclusive" during the test report review process, when confounding factors have made the results difficult to interpret. In the 1990's, inconclusive tests were often the result of the "pathogen effect" (a biological interference) in fathead minnow chronic tests (see Chapter 2.7 at http://dnr.wi.gov/topic/wastewater/documents/Chap2x7RWDilutionProblems.pdf for a detailed discussion of this phenomenon). When the pathogen effect occurs, there is usually high variability between replicates and an abnormal concentration-response (i.e., lower effluent concentrations have poorer performance than higher concentrations), which may make test results unreliable. Tests may also be labeled inconclusive for other reasons. For example, high variability in a *C. dubia* test due to unhealthy populations or the presence of males.

   In many cases, inconclusive tests cannot be used in Reasonable Potential Factor (RPF) determinations because confounding factors have made the results difficult to interpret and it is hard to tell whether the effluent would have "passed" or "failed" with the affected species. There may be instances where inconclusive tests do provide information that is useful in making RPF and WET limits decisions, however, the decision to use this data should be made carefully and, in most cases, should involve discussions with the Biomonitoring Coordinator. For example, if toxicity problems have been noted in *C. dubia* tests, it may be appropriate to consider data from the *C. dubia* portion of inconclusive tests (assuming it was the fhm portion that was inconclusive), in some cases.

   Inconclusive tests should be used in RPF determinations when the unaffected species (i.e., the one that wasn't "inconclusive") showed effluent toxicity. For example, if the fathead minnow portion of the test was labeled inconclusive due to the pathogen effect, the test should not be used in the RPF calculation unless the *C. dubia* portion of the test failed. The reverse would also be true if the *C. dubia* portion was inconclusive - the test would be used if the fathead minnow portion had failed. If one species has clearly shown effluent toxicity, enough data is available to label the test a failure (because the test would have been a failure even if the "inconclusive" species had passed).

   NOTE: Changes were made to WET methods in 2004 to remove the "pathogen effect" from chronic fathead minnow tests. Since these method changes were made, there have been no inconclusive tests due to this phenomenon.

4. **WET Method Changes and Older WET Data.** Significant changes to WET test methods were implemented by certified labs by the end of June 2005. Therefore, data collected before this date should be excluded from reasonable potential determinations unless 1) it shows repeated toxicity that was never resolved or 2) older data is all that is available and no significant changes have occurred which obviously makes it unrepresentative. It is recommended that all representative data collected after June 2005 be used in reasonable potential determinations. Still, staff should use judgment when determining whether treatment, process, or other significant changes have occurred which would render data unrepresentative. Staff should evaluate test data to determine whether factors such as treatment plant upgrades, industrial process modifications, or other significant changes have caused WET data to no longer be representative of the discharge, and should not disqualify data simply because it was not generated during the last permit term.

5. **Split samples.** Care should be taken to count only tests conducted on unique effluent samples. Tests are occasionally conducted simultaneously at a contract lab and the State Lab (or at two contract laboratories) as a check on laboratory performance and/or sampling procedures and should not be counted as separate tests in the RPF calculation. Information from these tests may point out problems, however, which may lead to data elimination (for example, if split samples indicate a contaminated sampler or lab error caused past toxicity problems).

6. **Contributing Sources.** It may be necessary to investigate source loadings to the WWTP, including industrial sources to a municipality. For example, abrupt changes in WET results may be explained by the shutdown of a local industry or the clampdown by a municipality on its industrial contributors. Wide fluctuations in data could represent slug loads from contributors that remain undetected for a time and then reoccur. Wide fluctuations in data caused by permanent industrial discharges or regularly discharged slug loads (for example, a high strength waste that is occasional, but expected) should not cause data to be thrown out. For industrial permittees, wide fluctuations in a data set could mean

a change in manufacturing processes. Data gathered during a period when a particular process was used, that is no longer in use (and won't be used during the next permit term), are not likely to be representative of the present discharge and may be excluded.

7. **WWTP upgrades.** Consider whether treatment processes have been upgraded which could significantly affect toxicity removal through the plant. Remember that toxicity can be caused by many factors and an upgrade that only improves solids or BOD_5 removal may not affect effluent toxicity. Data collected prior to an upgrade should be thrown out, in most cases, only if data collected after the upgrade suggests a change in effluent toxicity.

8. **TREs.** Data generated during toxicity reduction evaluations are not usually used in RPF calculations, unless they were compliance-style tests done to demonstrate the successful completion of the TRE. Tests completed during a TRE often involve single-species, fewer dilutions, or effluent modifications in order to investigate toxicity and are not comparable to standard toxicity tests. Successful TREs usually identify the cause of previous toxicity, the solution used to eliminate toxicity, and results from WET tests conducted after implementation of changes showing that toxicity is gone (accounting for seasonal, process, source loading and other changes, when appropriate). Therefore, successfully completed TREs change the discharge's toxicity. In most cases, successful completion of the TRE means that previously collected data (including that collected during the TRE) are no longer representative. In these cases, only tests that were collected after the TRE and representative of current discharge conditions should be used in RPF calculations.

In order to demonstrate that previous WET data is no longer representative of the current discharge, information is usually needed that gives a reason as to why data may no longer be representative (for example, significant changes in wastewater treatment, contributing industries, or industrial processes). In most cases it will also be necessary to provide WET data which shows a change in toxicity (e.g., data collected after changes were made). Depending on the seasonal nature of the discharge and other factors, 3-4 passing tests conducted (at least 30 days apart) under normal operating conditions is usually enough to demonstrate that changes have resulted in toxicity removal. When representativeness of existing data is questionable, more experienced permittees (or those helped along by supportive Department staff) will conduct additional tests when faced with positive results that they know may trigger a limit.

Other factors may cause data to be unrepresentative. Staff should use BPJ to determine when this is the case and talk to the Biomonitoring Coordinator if questions arise. **It is essential that decisions be well documented. Decisions will be more defensible if the Department can demonstrate it is actively applying a set of criteria in arriving at them. Documentation also helps to make future decisions and assess opportunities for program improvement.**

Step 3 - Determination of Monitoring Frequency and Need for a Limit

Once it is determined which data are representative, it can be decided whether a limit is necessary and how much monitoring should be done. WET limits are established "*to insure that substances shall not be present in amounts which are harmful to aquatic life...*" (ch. NR 106, Wis. Adm. Code). Limits should be given whenever WET and/or other data shows there is a reasonable potential for a toxicity problem to be present.

Should WET limits be carried over into the next permit? In situations where a WET limit was previously given, a TRE was completed, and monitoring shows that toxicity was removed, WET limits should not be automatically carried over from the previous permit. Instead, WET and facility-specific data should be reassessed and the Checklist redone with each reissuance. However, if previous toxicity problems were not fully resolved, the WET limit **should be carried over** into the next permit term, in order to insure that work continues to remove toxicity. If questions exist, staff should talk to the Biomonitoring Coordinator.

SWAMP – WET Checklist (General Information)

To help staff make WET limit and monitoring decisions, the WET Checklist was created in the "**S**ystem for **W**astewater **A**pplications, **M**onitoring, and **P**ermits" (SWAMP). The WET Checklist is intended for use by staff when making WET recommendations during the permit reissuance process. The Checklist is designed to assist staff when assigning WET limits and levels of WET monitoring to individual discharges, based on their potential to exhibit toxicity or exceed water quality standards. As the potential for toxicity increases, more points accumulate and more monitoring is recommended to insure that toxicity is not occurring.

The WET Checklist and Chapter 1.3 are intended as guidance, and do not contain mandatory requirements except where statute or administrative rules are referenced. They are intended to apply in most situations, but there may be cases where the assumptions they are based on do not apply and deviations will be necessary (some examples of this are given in the *Reasons for Changing Monitoring Frequencies* section, starting on page 26). The Checklist is designed to assist staff when making decisions regarding WET monitoring and limits, is intended solely as guidance, and recommendations based on the Checklist should be made accordingly. **If staff have reason to deviate from WET Checklist recommendations, they should share their decisions with the Biomonitoring Coordinator and clearly document their decisions so that others can tell why they were made.**

Questions asked by the WET Checklist and the screens as they appear in SWAMP are presented below. After each screen is further instruction and explanation of the points given and information needed. A "WET Checklist Questions Summary" is included in attachment 3, which includes questions asked, information needed, and points assessed in the WET Checklist. This summary is intended as a guide for use when determining the information needed to complete the Checklist and ***is not intended for use in place of the SWAMP WET Checklist***.

Points Assessed. The Checklist assigns points based on factors present that increase the chances for toxicity. Points are based on responses given and may be assessed towards acute, chronic, or both types of monitoring. Points given for each question are shown after each screen. The "Points Assessed" tables shown indicate whether points are added to acute, chronic or both. The completed Checklist recommends acute and chronic WET limits (when needed), based on RPF calculations required by s. NR 106.08, Wis. Adm. Code, and WET monitoring frequencies, based on points accumulated during the Checklist analysis. Once the Checklist is complete, the user can generate a summary of points assessed and answers given, by clicking on the "Generate" button shown on the lower right corner of the screen.

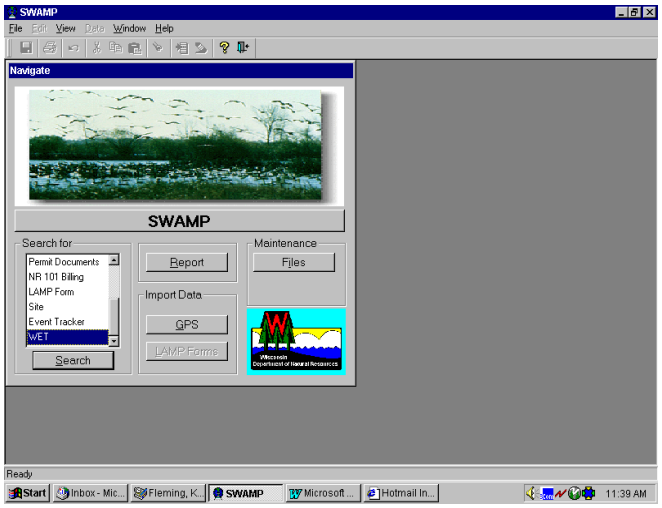
SWAMP – WET Checklist (Getting Started)

1) In order for the Checklist to work, information regarding effluent flow (Qe), Qe withdrawn from the receiving water (RW), RW flow ($Q_{7,10}$), and RW classification must be entered in the "Sample Point" table. This information must be entered before creating a new Checklist or revising an existing Checklist. (See attachment 4 at the end of this chapter for instructions on entering or changing data in the "Sample Point" area of SWAMP).

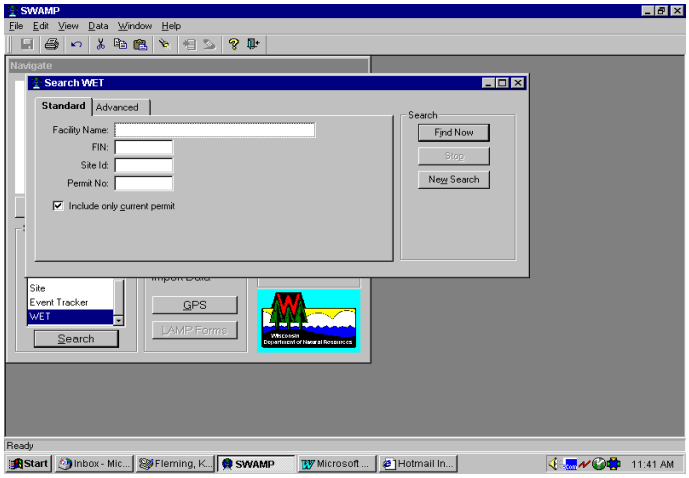
   NOTE: the checklist automatically uses default values such as Qs= 1/4 $Q_{7,10}$. If another value is appropriate, staff will need to determine ratios and IWCs separate from the checklist and acknowledge this difference in WQBEL memos.

2) Due to space limitations, the following screens may be difficult to read. Users should refer to actual SWAMP screens for readable versions of those described below.

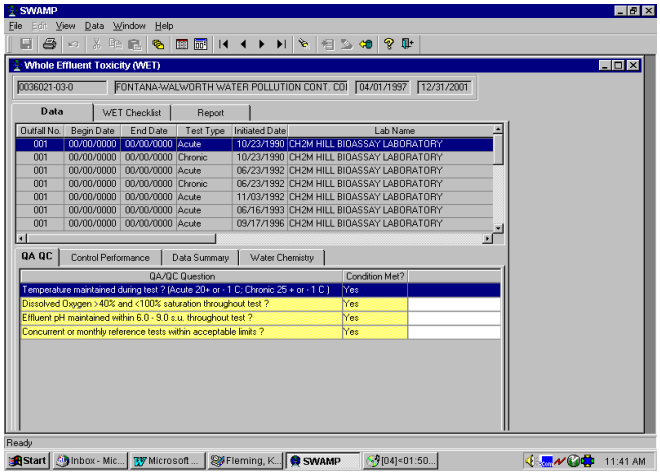
3) **Before completing the Checklist, the user will need to evaluate available WET data and make judgments about which data are representative of the discharge** (see pp. 1-5). WET Database reports provide information to help with these decisions. For instructions on WET Database reports, staff should read user documentation on the watershed file directory at W:\SWAMP\SWAMP User Manual\WET_Database.doc.



At the Navigate screen (shown above), click on "WET" in the "Search for:" box, then click on the "Search" button.



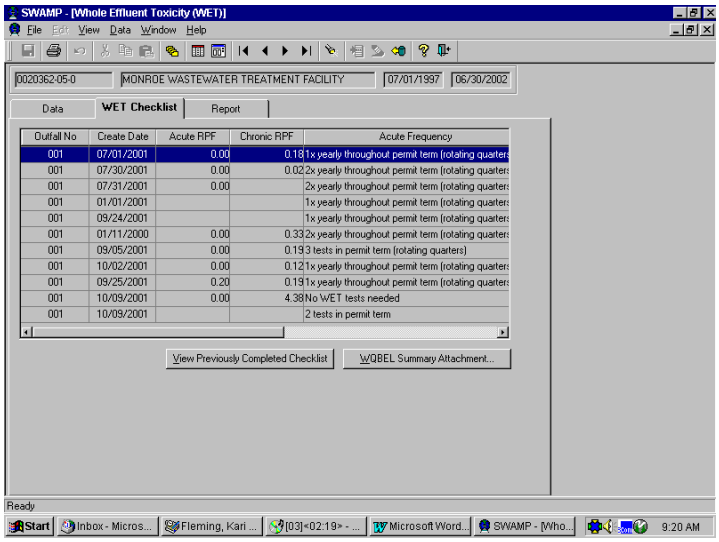
When the "Search WET" window appears (above), enter the permit number and click the "Find Now" button. From the list given, click on the facility you are interested in and then click on the "Open" button. The "Whole Effluent Toxicity (WET)" screen then appears (below) with the Data tab displayed. Maximize the screen by clicking on the box in the upper right corner.



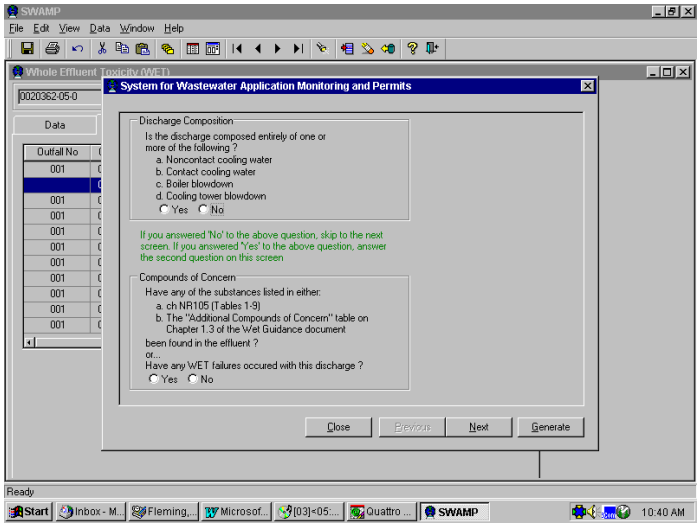
SWAMP – WET Checklist (Creating New or Modifying an Existing Checklist)

To modify an existing Checklist or to create a new one, select the "WET Checklist" tab from the "Whole Effluent Toxicity (WET)" screen (shown above). The WET Checklist screen (shown below) will show a list of previously completed WET Checklists (if any) for the given facility, the date each was created and last updated, the person who completed the last update, and other pertinent information. This screen also allows the user to create an abbreviated summary of a completed WET checklist to be attached to a WQBEL document (by clicking on the "WQBEL Summary Attachment" button), or a more complete summary showing answers given, point totals, and monitoring and limit recommendations (by clicking on the "View Previously Completed Checklist" button).

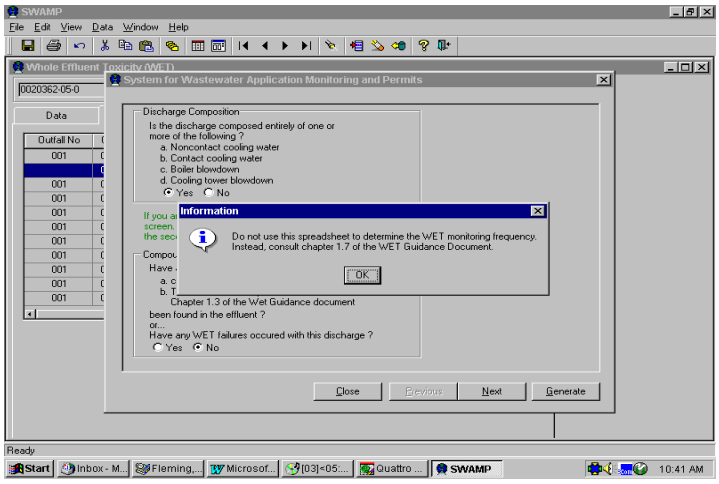
To modify an existing Checklist, select the appropriate row, then double-click. To create a new Checklist, right-click in the WET Checklist tab area, then choose "insert".



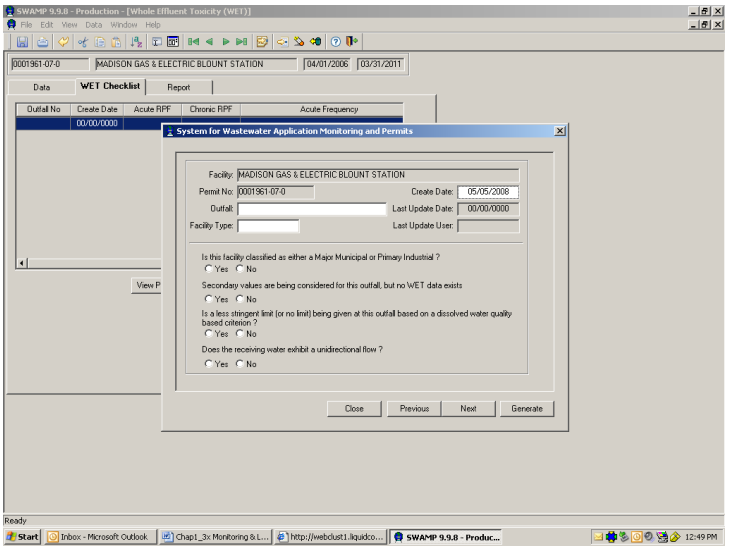
When selecting a completed Checklist or starting a new Checklist, the following screens will appear in sequence:



The questions shown in the screen above are designed to determine whether the user has chosen the correct tool for determining WET monitoring frequencies. If the discharge is <u>not</u> made up entirely of noncontact cooling water, contact cooling water, cooling tower blowdown, or boiler blowdown (i.e., if the answer to the 1st question is "no"), the Checklist is appropriate and will continue to the facility information screen shown on page 9 (the answer to the 2nd question does not matter and the Checklist will not allow it to be answered). If it <u>is</u> solely a nccw, ccw, ctb, or bb discharge (i.e., if the answer to the 1st question is "yes"), the Checklist only needs to be completed if WET failures have occurred or if "compounds of concern" have been detected (so the answer to the 2nd question will need to be given for the Checklist to continue). If the discharge is made up solely of one of the categories mentioned above <u>and</u> no compounds of concern have been detected in that discharge <u>and</u> no WET failures have occurred (in other words, a "yes" is given in the 1st question, and a "No" in the 2nd), an information box will appear pointing the user to Chapter 1.7 instead of the WET Checklist (see below). *NOTE: Chapter 1.7 is designed to help users deal with additives in cooling and blowdown waters. If no additives are present, it is not necessary to use Chapter 1.7 - WET testing is not needed.*



If answers given in the Discharge Composition/Compounds of Concern screen (shown on the previous page) indicate that the discharge is not composed entirely of noncontact cooling water, contact cooling water, boiler blowdown, or cooling tower blowdown, or if substances listed in ch. NR 105, Wis. Adm. Code, or the "Additional Compounds of Concern" table have been detected or WET failures have occurred, the Checklist will continue to the next screen.



Information entered in the screen above identifies the outfall being assessed, its discharge type, and other pertinent information. WET Checklists will need to be completed for each outfall at each facility (unless it has been decided that site-specific situations are better represented by conducting WET tests on combined outfalls). The Checklist will automatically update the "last update date" and "last update user" each time the Checklist is revised.

Facility Type: The user must choose "municipal" or "industrial". (NOTE: all "nonmunicipal" discharges, including Superfund and groundwater remediations, are lumped under industrial for the purposes of this Checklist). Indication of facility type is necessary for the Checklist to continue, as future screens appear based on this designation.

Major Municipal or Primary Industrial: Federal regulations require that major municipal dischargers (≥ 1 MGD) submit at least 4 acute and chronic WET tests with the permit application. 40 CFR 122.21(j) of the Federal Regs says: *"All POTWs with design flows equal to or greater than one million gallons per day..."* and *"All POTWs with approved pretreatment programs..."* must submit toxicity test information with the permit application. It goes on to say that *"Such testing must have been conducted since the last NPDES permit reissuance or modification..."*. It is recommended that this requirement be extended to include primary industries (process waters only). Regulations allow tests to be conducted within the previous term of the permit, so it is recommended that all major municipal and primary industrials conduct at least 1x yearly acute and chronic monitoring (need for chronic is based on dilution), so that data is available for the next permit application. The Checklist does not assign points for this question, but instead evaluates whether the points given once the Checklist is complete will be enough to satisfy this requirement. If less than 1x yearly testing would be recommended by point totals, the Checklist recommends 1x yearly monitoring for these dischargers.

Secondary Values: In situations where secondary values are being considered, those substances are present at levels of concern, and no WET data is available, the *Water Quality Rules Implementation Plan* (1/98; Ch. 3A), recommends that monitoring for that substance and at least 2x annual acute and chronic WET (need for chronic based on dilution) be required in the permit. The Checklist uses this question to insure this monitoring frequency is recommended

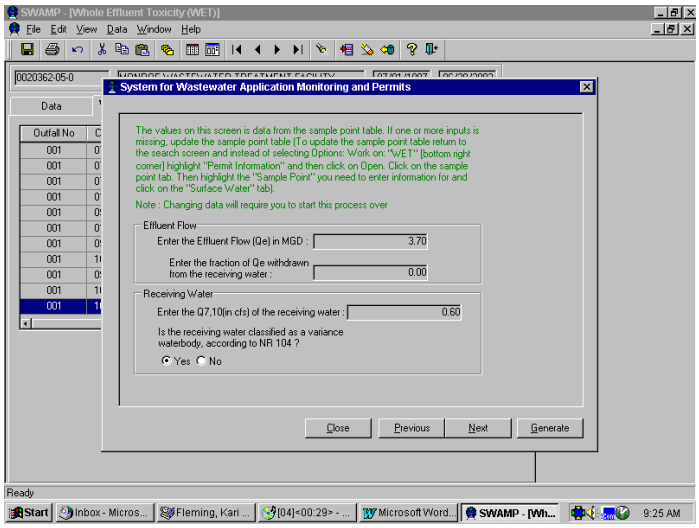
whenever secondary values are considered. The *WQ Imp. Plan* also recommends that chemical-specific monitoring be conducted on WET samples.

Dissolved Water Quality Criterion: The *WQ Imp. Plan* (Ch. 4), recommends that 1x yearly acute & chronic WET be given to any discharge which receives a less stringent effluent limit (or no limit) based on a dissolved water quality criterion. The Checklist uses this question to insure that this monitoring frequency is recommended when effluent limits are given based on dissolved water quality criteria. WET in these situations should be applied at the point of application of the chemical-specific limit (regardless of stream classification, distance to full fish and aquatic life waters, etc.).

Does the Receiving Water Exhibit a Unidirectional Flow? Because the magnitude of toxic effect usually increases as effluent concentration increases, one of the most important factors affecting WET potential is dilution. A very toxic effluent may cause less environmental damage if there is a lot of receiving water dilution available, than a less toxic effluent would if there is very little available dilution. Since dilution and mixing are important considerations used to determine types of WET testing, the Checklist evaluates this information.

The last question in the screen above asks whether the receiving water is a flowing water, in order to determine whether sufficient mixing is present at the point of discharge. If the receiving water is a flowing waterbody, the Checklist continues to the next screen. If the discharge is to a non-flowing waterbody (for example, a lake, pond, or static wetland), a "No" is given. Since adequate mixing does not occur in these situations, the Checklist assigns an instream waste concentration (IWC) of 9% (as required in s. NR 106.06) and skips to the "Calculate RPF" screen on page 14.

NOTE: the checklist automatically assumes a default 10:1 dilution ratio and an IWC = 9%. If use of another ratio is appropriate, staff will need to calculate the IWC separate from the checklist and acknowledge this difference in WQBEL memos.

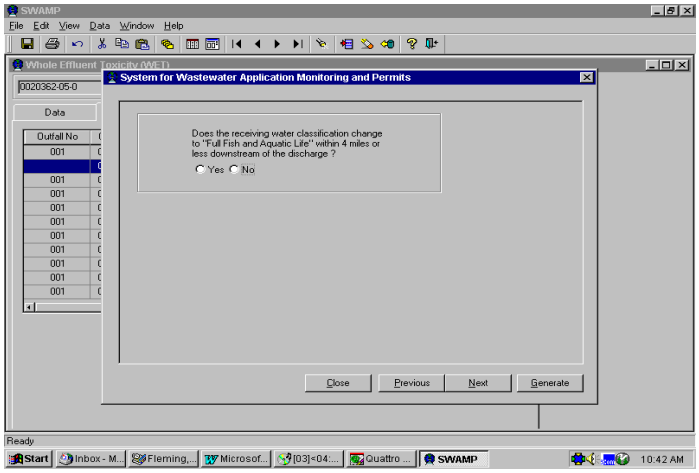


The values that appear in the screen above are entered in the sample point table in another area of SWAMP. If one or more inputs are missing from these three boxes, the user will have to update the information in the Sample Point table, before completing the WET Checklist (see attachment 4 for instructions).

The effluent flow (Q_e) used in the WET Checklist is usually the annual average design flow for municipals or average annual actual flow for industrial dischargers. The Checklist will use the Q_e and $Q_{7,10}$ information entered in this screen to determine the appropriate $Q_{7,10}$:Q_e ratio, IWC, and chronic dilution series (more discussion of these values are given later in this chapter). The withdrawal factor (f) should be entered as a decimal (for example, if the facility withdraws and uses ½ of it's water from the receiving water, enter 0.5). This value will be used as "f" in the IWC calculation, discussed later in this chapter.

The last question in the effluent and RW flow information screen (above) determines the appropriate flow value which should be used to make WET determinations. This question and the next 3 screens below help the user make the appropriate receiving water flow decisions as described in Chapter 1.2 (http://dnr.wi.gov/topic/wastewater/documents/Chap1x2RWUse.pdf). In most cases, the appropriate flow value used to determine the need for chronic testing, and to calculate the IWC and choose the correct chronic dilution series, will be the $Q_{7,10}$ of the first non-variance classified water encountered by the discharge. In situations where a low flow other than the $Q_{7,10}$ was used (for example, a $Q_{4,3}$) that value may be substituted for the $Q_{7,10}$ in this ratio. The low flow value that was chosen for making WET determinations should be the same flow used to calculate chronic WQBEL limits. *NOTE: the checklist uses default values such as annual average effluent flow, 1/4 $Q_{7,10}$ and a 10:1 dilution ratio for lake dischargers. If use of other values are deemed appropriate, staff will need to determine flow ratios and calculate IWCs separate from the checklist and acknowledge this difference in WQBEL memos.*

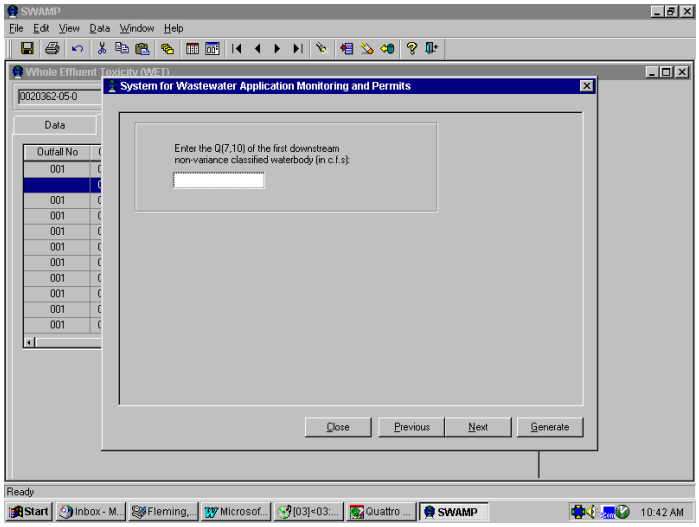
Variance Waterbodies: If the receiving water is classified as a variance waterbody, the Checklist continues to the next screen. If the receiving water is not a variance waterbody, the Checklist skips 3 screens and goes to the "Calculate RPF" screen on page 14.



As described in Chapter 1.2 (http://dnr.wi.gov/topic/wastewater/documents/Chap1x2RWUse.pdf), in situations where the effluent is discharged into a "variance" waterbody, the distance between the discharge and the point where the receiving water becomes a coldwater, warmwater sport fish, or warmwater forage fish waterbody will have to be determined. (Please note that the determination of whether or not a waterbody should be categorized as a "variance" water is not limited solely to whether they are listed in code, rather these decisions should be made based on what is known about biological populations and the BPJ of local water quality biologists. See Chapter 1.2 for more discussion of this topic.) When this distance $\leq$ 4 miles, the flow used should be that of the non-variance waterbody. If the distance is > 4 miles, chronic testing is usually not recommended unless data exists suggesting a potential for chronic impacts. **If chronic WET failures exist, it may be necessary to require additional chronic monitoring to insure that receiving water impacts are not occurring** (see Chapter 1.2 for more discussion). If staff feel there are sufficient

reasons to require monitoring in these situations they should contact the Biomonitoring Coordinator and document their reasons for doing so, so others can tell why decisions were made.

If the closest non-variance classified waterbody is > 4 miles away, the Checklist asks whether the user would like to determine chronic frequencies anyway, then continues to the RPF screen (p. 14). If ≤ 4 miles away, the Checklist goes directly to the next screen shown below, where the $Q_{7,10}$ of the 1st downstream non-variance waterbody is asked for.



Qs:Qe Ratio: After the appropriate $Q_{7,10}$ and the Q_e have been selected, the Checklist determines the $Q_{7,10}$:Q_e ratio, the IWC, and the appropriate chronic dilution series, as described below.

> **If $Q_{7,10}$:Q_e > 1000:1**, no WET testing is recommended, since dilution is high and the potential for impacts due to toxicity are low. Staff may, in certain circumstances, determine that testing is necessary despite high dilution and the Checklist allows the user to continue in these circumstances. The Checklist does not need to be completed if no testing is determined to be necessary, however this decision should be clearly documented in the permit file, so others can tell why decisions were made.
>
> **If $Q_{7,10}$:Q_e ≤1000:1 & >100:1**, only acute testing is recommended, since dilution is high and the potential for impacts due to chronic toxicity are lower. Staff may, in some instances, determine that chronic testing is necessary despite high dilution and the Checklist allows the user to continue in these circumstances.
>
> **If $Q_{7,10}$:Q_e ≤ 100:1**, acute and chronic WET testing is recommended. The Checklist will continue to the next screen and determine recommended acute and chronic monitoring frequencies.

Dilution Series. In the "*State of Wisconsin Aquatic Life Toxicity Testing Methods Manual, 2nd Edition*" (Methods Manual), Section 4.12:

- the standard acute dilution series is 6.25, 12.5, 25, 50, 100% and
- for chronic the dilution series is:
  - 100, 30, 10, 3, 1%, if the IWC is ≤30% or
  - 100, 75, 50, 25, 12.5%, if the IWC is >30%.
- These dilution series should be appropriate in most situations and are therefore recommended by the WET Checklist. In some cases, a site-specific dilution series may be necessary. Guidance for determining when

another dilution series may be appropriate is given in Chapter 2.11 (http://dnr.wi.gov/topic/wastewater/documents/Chap2x11DilutionSeries.pdf).

The Instream waste concentration (IWC) is an estimate of the proportion of effluent (Q_e) to total volume of water, or effluent + receiving water ($Q_e + Q_s$). Because the magnitude of toxic effect usually increases as concentration increases, one of the most important factors affecting WET is dilution. A very toxic effluent with large dilution may cause less environmental damage than a slightly toxic effluent with very little dilution, therefore facilities with higher IWCs are given more points. The Checklist calculates the IWC according to the following equation (*Qe=effluent flow; f=fraction of the Q_e withdrawn from the rec. water; and Q_s = 1/4 of the Q7,10)*:

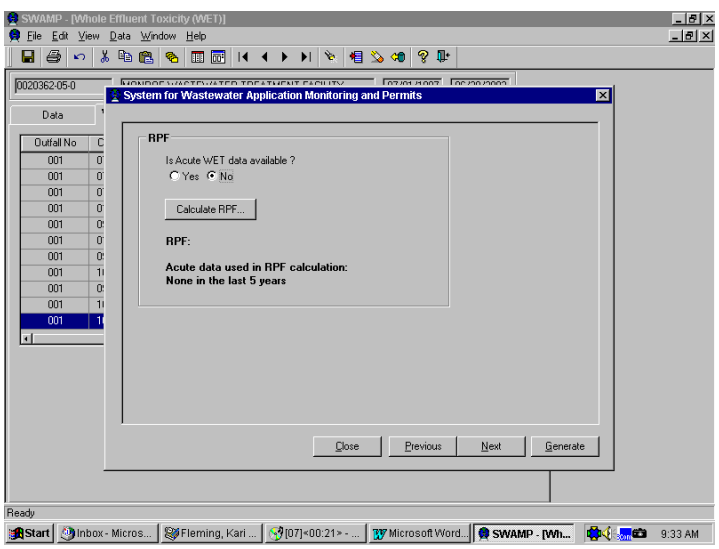
$$\text{IWC (as \%)} = 100 \times \frac{Qe}{(1-f)Qe + Qs}$$

NOTE: There may be times when values other than ¼ $Q_{7,10}$ or a ratio other than 10:1 should be used. Since these cases are not the norm, the Checklist does not account for them. Staff will have to make adjustments outside of the electronic Checklist in these cases.

POINTS ASSESSED (Chronic only)

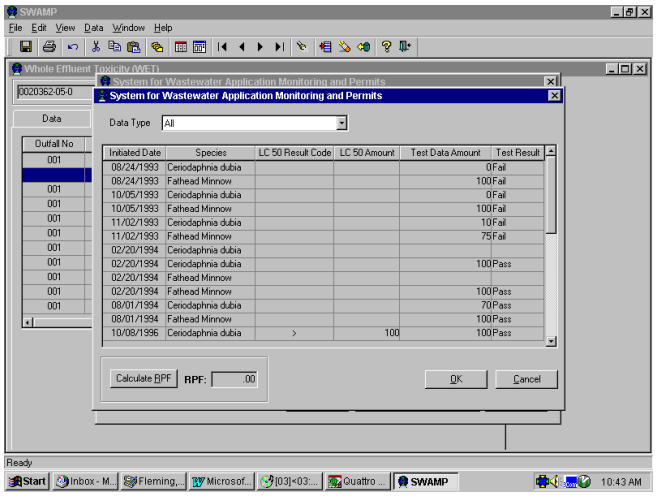
If the IWC is:	*Points given:*
≤ 35%	*0*
> 35 and ≤ 65%	*10*
> 65%	*15*

Historical Data and RPF: Once flow, IWC, and dilution series decisions have been made, the Checklist continues to the next screen:



In the screen above, the user states whether there is representative acute WET data available for the discharge being evaluated, then clicks on "Calculate RPF" if data is available, in order to choose the data that is to be used to calculate the acute RPF. **Points should be assigned here (a "No" given) if no <u>representative</u> data has been generated for the discharge in the last 5 years. This does not mean that data older than 5 years cannot be used in RPF determinations. It is just a check to be sure that the effluent has been monitored for WET in recent times.** If no data is available, the acute RPF = 0 and the Checklist assigns 5 points. This is done because more uncertainty exists in situations where testing has not been done than at those facilities that have produced recent data which shows toxicity problems are

not a concern. If no data is available, the Checklist proceeds to the "effluent variability and treatment operations" screen (on page 17). If data is available, it proceeds to the next screen.



WET limits are required according to s. NR 106.08, Wis. Adm. Code., as follows: *"Whole effluent toxicity limits shall be imposed in a WPDES permit whenever the RPF calculated according to par. (b) exceeds 0.3. Whole effluent toxicity limits may be imposed, on a case-by-case basis, whenever facility-specific whole effluent toxicity test data indicate toxicity to aquatic life as determined in s. NR 106.09. Whole effluent toxicity limits may also be imposed in the absence of facility-specific whole effluent toxicity test data, on a case by-case-basis, whenever facility-specific or site-specific data or conditions indicate toxicity to aquatic life that is attributable to the discharger."*

The Checklist uses data selected in the screen above to calculate a Reasonable Potential Factor (RPF). Reasonable potential is defined as where an effluent "*is projected or calculated to cause an excursion above a water quality standard*". WET limits should be given whenever representative, facility-specific data shows the effluent may be discharged at a level that has the potential to cause or contribute to an excursion above a WET criterion. An RPF is calculated using the data entered by the user according to the following equations, as required in s. NR 106.08(5)(b):

*"(b) **Reasonable Potential Factor**. The percentage of failures and the severity of those failures for the most sensitive species shall be used to determine when a whole effluent toxicity limit is established in a permit.*

1. When a zone of initial dilution has not been approved by the department, a RPF for acute toxicity shall be calculated as follows for toxicity test data with a calculated LC_{50}:

RPF = Geometric Mean TU_a x Failure Rate; Where: Failure Rate = (Tests Failed/ Tests Conducted)

2. When a zone of initial dilution has not been approved by the department, a RPF for acute toxicity shall be calculated as follows for toxicity test data without a calculated LC_{50}:

RPF = Geometric Mean S x Failure Rate

Where: $S = (50 + X)^{1/2}$

Where: X = 50 if the percent survival in 100% effluent is greater than or equal to 50%,

X = 5 if the percent survival in 100% effluent is less than or equal to 5%,

X = the percent survival in 100% effluent when the percent survival is less than 50% and greater than 5%.

Failure Rate = (Representative Tests Failed/Representative Tests Conducted)

3. When a zone of initial dilution has been approved by the Department, according to s. NR106.06(3)(c), a RPF for acute toxicity shall be calculated as follows:

RPF = Failure Rate Where: Failure Rate = (Representative Tests Failed/Representative Tests Conducted)"

NOTE: $TU_a = 100/LC_{50}$; $LC_{50} > 100 = 1.0\ TU_a$; geo. mean = $10^x(\log C_1 + \log C_2 + \ldots + \log C_n)/n$.
Example RPF calculations are attached at the end of this chapter.

Which data to use. Acute test requirements have changed over time, as the WET program has evolved. From about 1989-96, permittees tested only 100% effluent and passed when there was ≥50% survival in 100% effluent. The 1st edition of the Methods Manual made changes to these requirements, so that permits issued after 1996 required a full dilution series and generation of an LC_{50}. This was accounted for when the RPF was promulgated in NR 106.08, Wis. Adm. Code, and the WET Checklist was created - in order to select the appropriate equation to calculate an acute RPF, the Checklist requires the user to choose whether the dataset is mixed or contains all LC_{50}s. Given the passage of time since the Methods Manual was first written, it is likely that the first option ('mixed' datasets) is no longer applicable in most cases (i.e., non-LC50 data was collected prior to 1996 and is no longer of use).

When the screen shown above is first opened, the data that appears will include all WET information for that outfall in the WET Database. From the drop-down list at the top of the screen, the user selects the appropriate type of data to be used in the RPF calculation ("no data", "LC_{50} data only", "data include a 100% effluent component", or "ZID data only"). The data that appears in the screen will be sorted accordingly (for example, if the user selects "LC_{50} data only", only those tests with LC_{50} data will appear). The user then selects representative WET data that should be used in the RPF calculation, by highlighting one species from each test date that is to be used (only the most sensitive species should be selected – see next paragraph). Once the most sensitive species from each representative test has been highlighted, the user clicks the "calculate RPF" button to determine the RPF value.

Most sensitive species. When determining the correct values to be used from WET tests conducted with more than one species, one result for each test performed should be highlighted (**DO NOT highlight more than one species for each test**). The species selected should be the one that showed the most sensitivity to the effluent (i.e., the lowest LC_{50}) for each test. For example, if 2 acute tests were completed and the 1st resulted in an LC_{50} = 50% for *C. dubia* and an LC_{50} = 75% for the fathead minnow, and the 2nd resulted in an LC_{50} >100% for *C. dubia* and an LC_{50} = 25% for the fathead minnow, the user would select the *C. dubia* result (LC_{50} = 50%) from the 1st test and the fathead minnow result (LC_{50} = 25%) from the 2nd test.

Tests using only one species. Permit-required WET tests require a battery of test organisms, in an attempt to represent the different sensitivities of various trophic levels and taxonomic groups. In order for the use of one species to be as protective as a permit-required battery, the amount, type, and ratios (if more than one) of toxicant(s) in the discharge would always have to be the same. For these reasons, WET tests done with only one species should not be used in RPF calculations. Only tests completed according to permit requirements should be used in RPF calculations.

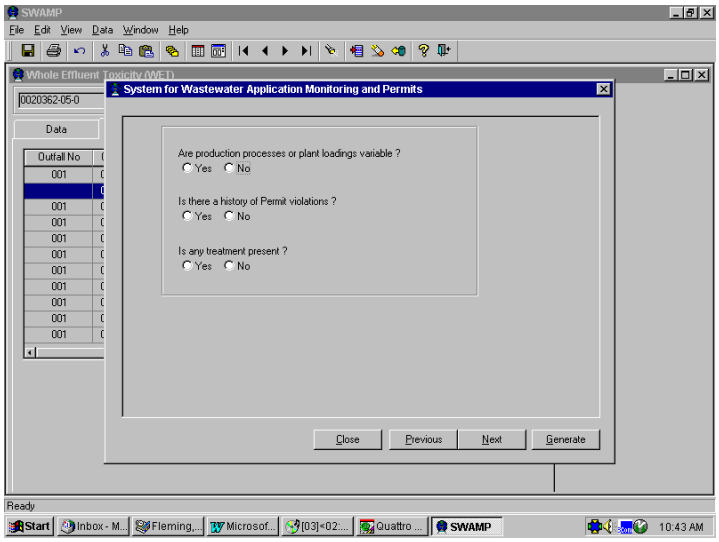
Limits must be given to permittees who have an RPF ≥ 0.3. WET limits are required according to s. NR 106.08, Wis. Adm. Code., whenever *the RPF calculated according to par. (b) exceeds 0.3."* WET limits may also be imposed when *"facility-specific or site-specific data or conditions indicate toxicity to aquatic life that is attributable to the discharger."* So, WET limits **must** be given when the RPF ≥ 0.3 and ≥ 5 WET data, but may be given anytime that the Department feels WET or other data suggests a potential for a toxicity problem (e.g., if the RPF is near 0.3, if there are < 5 WET data but the RPF ≥ 0.3, etc.). To keep it simple, the WET Checklist states that a WET limit is required only when required by s. NR 106.08, Wis. Adm. Code (i.e., when RPF ≥ 0.3 and ≥ 5 WET data). However, due to the uncertainty associated with fewer data points, the WET Checklist will give higher points to those permittees with an RPF ≥ 0.3, even if they have fewer than 5 data. These facilities should also be evaluated to determine whether a WET limit is necessary. In situations where data exists which causes reason to believe the effluent is or may be discharged at a level that will cause, have the potential to cause, or may contribute to an excursion above a WET criterion, a limit should be given, even if there are less than 5 data. Even though the Checklist will not automatically state that a WET limit is required, it may be necessary in some cases to consider whether a limit should be placed into the permit.

Compliance schedules requiring a toxicity reduction should be put in permits with new WET limits. Example language can be found in Chapter 1.12 (http://dnr.wi.gov/topic/wastewater/documents/Chap1x12WETLimitCompScheds.pdf).

POINTS ASSESSED (Acute only)

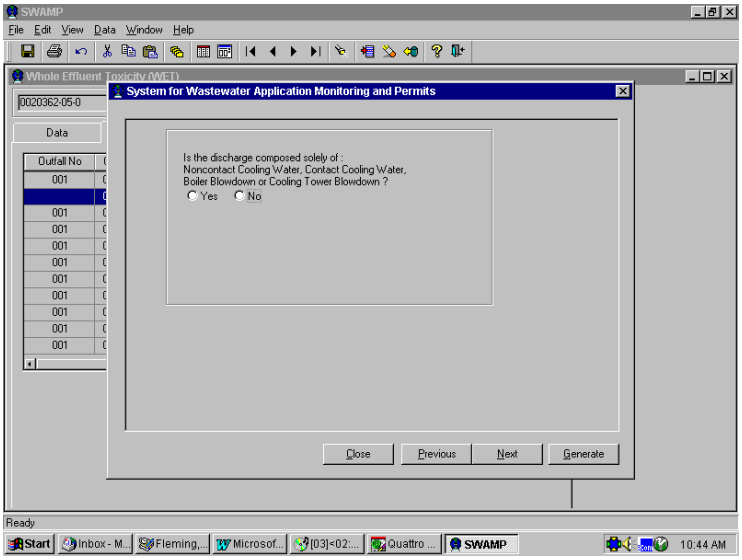
#TESTS	***RPF***	***POINTS***
NONE	***0***	***5***
1-4	***< 0.1*** ***≥ 0.1, but < 0.2*** ***≥ 0.2, but < 0.3*** ***≥ 0.3***	***0*** ***5*** ***10*** ***15***
≥ 5	***< 0.1*** ***≥ 0.1, but < 0.2*** ***≥ 0.2, but < 0.3*** ***≥ 0.3***	***0*** ***10*** ***20*** ***30 pts & a limit is required***

Effluent Variability and WWTP Performance: Once the acute RPF has been determined, the Checklist continues to the next screen:



It is necessary to monitor variable effluents more frequently, because of the inconsistency of the effluent matrix. Less frequent monitoring events may not represent effluent quality during each of the different effluent occurrences. Information requested here is used to assess whether the effluent may be highly variable. **Decisions made here are subjective, and should be based on the knowledge and BPJ of WDNR staff most familiar with the facility.**

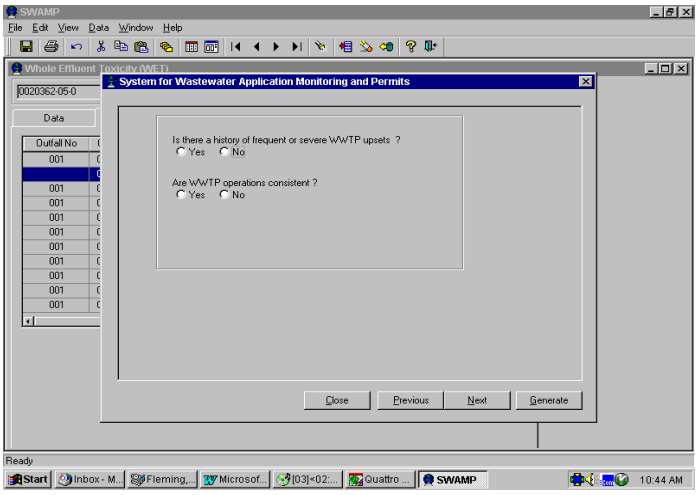
- **Question #1, Loading or Production Variability:** As effluent characteristics change (due to contributing industries, hauled wastes, leachate, infiltration, process changes, spills, etc.), so may effluent toxicity. Judgments should be made whether waste entering the system is resulting in a variable effluent, or if the system is handling incoming variability and effluent characteristics are relatively unchanged. Answer "Yes" if the judgment is made that variable waste that is entering the treatment system or operating conditions are resulting in a variable effluent.
- **Question #2, Compliance History:** Compliance history may be an indication of the quality and consistency of operations or the ability to handle incoming waste, which may affect effluent variability. Department staff should enter a "Yes" if the facility has had significant violations (e.g., those warranting enforcement action such as verbal/written NONs, etc.). All effluent characteristics should be considered, not just toxics.
- **Question #3** is used to determine whether variability may be effected by inadequate treatment. A "No" should be given in question #3 for discharges that do not have wastewater treatment. If a no is given, the next screen will appear. If a yes is given to question #3, the next screen will be skipped and the subsequent screen will appear.



- **Question #4:** The screen above allows exemptions from points assessed for no treatment for four discharge categories. For <u>all</u> other discharge categories (including contact cooling waters and COW discharges) a "No" should be given. **In situations where staff feel that points accumulated are not appropriate because the discharge would not otherwise warrant treatment, they should make adjustments to final monitoring recommendations (staff should <u>NOT</u> "adjust" points here by not assessing points for having no treatment). Adjustments to final recommendations should be justified, shared with the Biomonitoring Coordinator, and well documented so that others can tell why decisions were made.**

POINTS ASSESSED (Both Acute & Chronic)

Question#	*Answer*	*Points*
1	*NO*	*0*
1	*YES*	*5*
2	*NO*	*0*
2	*YES*	*5*
3 & 4	*BOTH YES*	*0*
3 & 4	*BOTH NO*	*10*
3 & 4	*3 NO, 4 YES*	*0*
3 & 4	*3 YES, 4 NO*	*0*



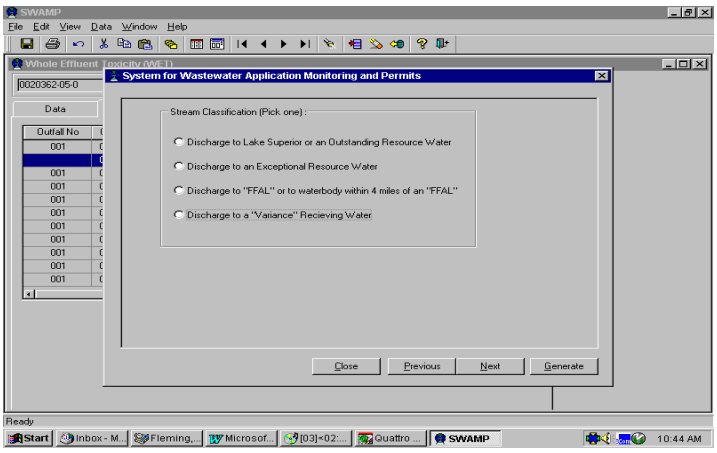
Question #1, Upsets: Frequent or severe upsets may be an indication of poor operations, underdesign of a treatment plant, slug loads within the collection system, etc., which raise the potential for effluent toxicity. Staff should make judgments whether frequent upsets are unexplained or not handled properly, which may affect effluent variability.

Question #2, Operations: The ability to maintain or restore quality treatment may affect effluent variability. If an operator is able to react quickly and effectively when treatment is upset, effluent characteristics are less likely to be affected for long periods of time. Conditions such as bulking and foaming, lost ability to nitrify, etc., may be an indication of poor treatment conditions and may affect effluent toxicity. Concurrent cases of activated sludge problems and effluent toxicity have been noted in many cases. Staff most familiar with the facility should determine whether operator(s) have reacted appropriately to situations that were controllable.

POINTS ASSESSED (Both Acute & Chronic)

Question#	*Answer*	*Points*
1	*NO*	*0*
1	*YES*	*5*
2	*NO*	*0*
2	*YES*	*5*

Stream Classification:

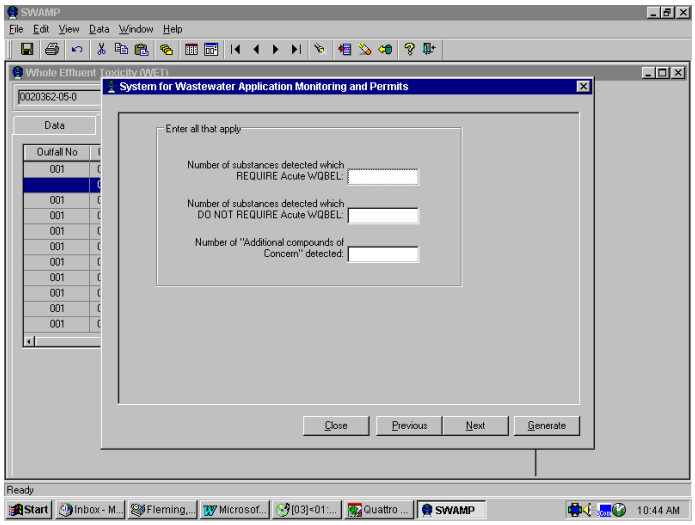


WET tests use “indicator organisms” to mimic what may happen in the environment when an effluent is introduced, to estimate the effluent concentration that may produce a harmful effect, and to predict concentrations that may interfere with the growth, development, and reproductive potential of aquatic organisms. Since “higher” classifications (e.g., exceptional/outstanding resource waters) designate waters where more sensitive populations or water quality exists, more monitoring is necessary to insure protection of these waters and the Checklist assigns points accordingly.

POINTS ASSESSED
(Both Acute & Chronic)

Answer	*Points*
Lake Superior or Outstanding Resource Water	***15***
Exceptional Resource Water	***12***
Full Fish & Aquatic Life or < 4 mi from FFAL	***5***
Variance	***0***

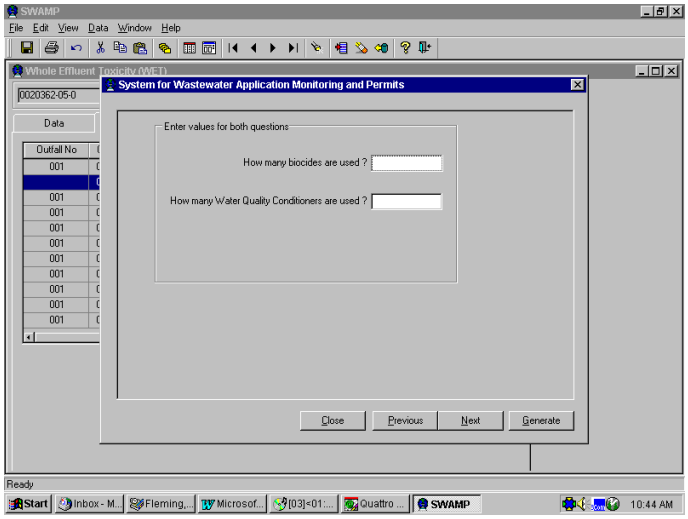
Chemical Specific Data – Acute:



Water quality criteria are designed to be protective of aquatic life for the compounds that they limit. Chemical-specific limits alone can’t account for additive or synergistic effects that occur when compounds are combined in an effluent. The more compounds present, the greater the potential is for additive or synergistic effects to occur. Staff should document which limits and/or detects were considered so it is clear to others why point totals were assigned. For a list of ch. NR 105, Tables 1 & 2, substances (i.e., those which may require acute WQBELs), and for a table of “Additional Compounds of Concern”, see attachment 2 at the end of this chapter. NOTE: As mentioned in attachment 2, ammonia limits should be counted only if representative effluent data demonstrates the need for a WQBEL (limits that are simply "carried over" from a previous permit term, even though effluent data suggests they are no longer needed, should not be counted as WQBEL limits). However, if ammonia has been detected in the effluent, it should be counted in that category.

POINTS ASSESSED (Acute only)

	Points
Acute WQBELs	***5 for 1st + 1 for ea. additional, not to exceed 10 pts.***
Detects w/out WQBELs	***1 for 1st + 1 for add. not to exceed 3***
Additional Cmpds of Concern	***2 (for ≥ 1 substance)***



Additives: Research into the toxicity of additives has shown that many of these compounds are at great risk to cause toxicity to aquatic life. Biocides, which are specifically designed to kill biological organisms, cause the most concern. Obviously, the more compounds present, the more complex the wastestream becomes and the greater the potential for additive or synergistic effects to occur. Points are given in the Checklist for all biocides or water-conditioning agents, based on the answers given in the screen above.

Biocides and water quality conditioners should be included in the analysis if they are added during the wastewater treatment process. If they are added prior to treatment (e.g., a production additive at an industrial facility) they should be included in the evaluation only when wastewater treatment is not expected to remove or significantly alter the toxicity of these chemicals (e.g., if less than secondary treatment is present).Chemicals added at the WWTP or after the effluent leaves the WWTP should be included in this evaluation, regardless of treatment plant type.

"Penalizing" permittees for using treatment chemicals. Some have questioned whether the Checklist "penalizes" permittees for using treatment chemicals "which are required by the Department". While chemicals are often chosen as alternatives in wastewater treatment (i.e., chlorine to disinfect, FeCl or alum to remove phosphorus, polymers to improve settling, etc.), they are not required and there are often biological alternatives which are less likely to cause toxicity to aquatic organisms. Points are assessed for treatment chemicals because they add to the potential for toxicity. It is important to realize that treatment chemicals may increase the risk of toxicity in wastewater.

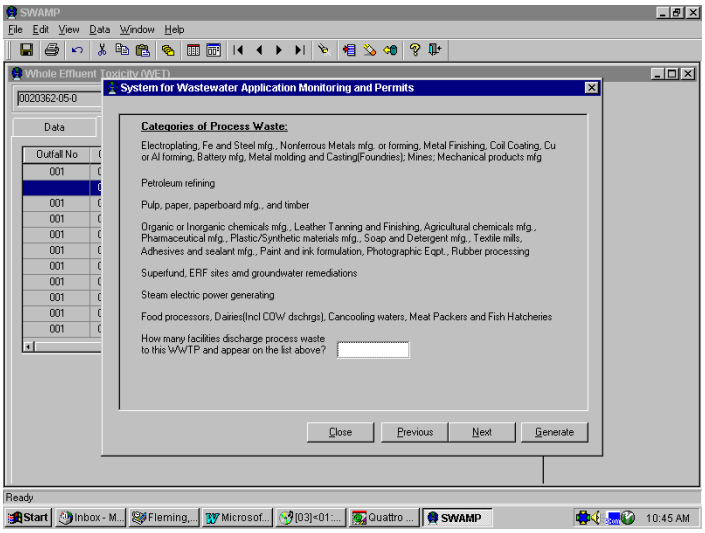
Examples:

Biocides - chlorine (& other halogens), fungicides, algalcides, herbicides, bacteria control chemicals, etc.
Water Quality Conditioners - dechlorination chemicals, alum, pickle liquor [FeCl], polymers, dyes, ammonia, phosphorus, anti-scale, corrosion-inhibitors, pH adjustment chemicals, conditioning agents, etc.

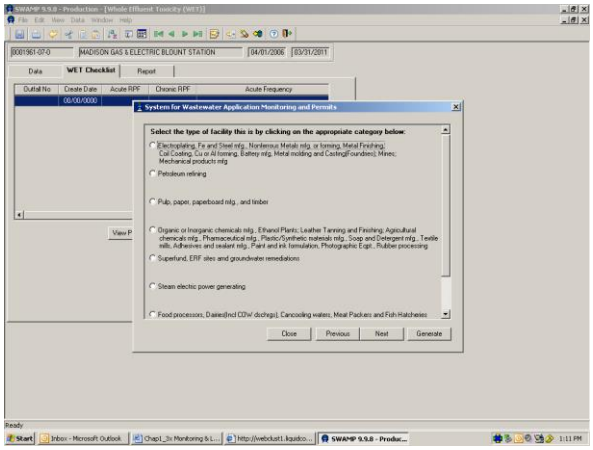
NOTE: If chlor/dechlor chemicals are added, points should be assessed for both (i.e., chlorine as a biocide, dechlorination chemicals as WQC). Points are also assessed if WQBELs for these substances are given (see pp. 18-19).

POINTS ASSESSED (Acute only)

	Points
Biocides	***3 pts. each (not to exceed 20 pts when combined w/WQC)***
Water Quality Conditioners	***1 pt. each (not to exceed 20 pts when combined w/biocides)***



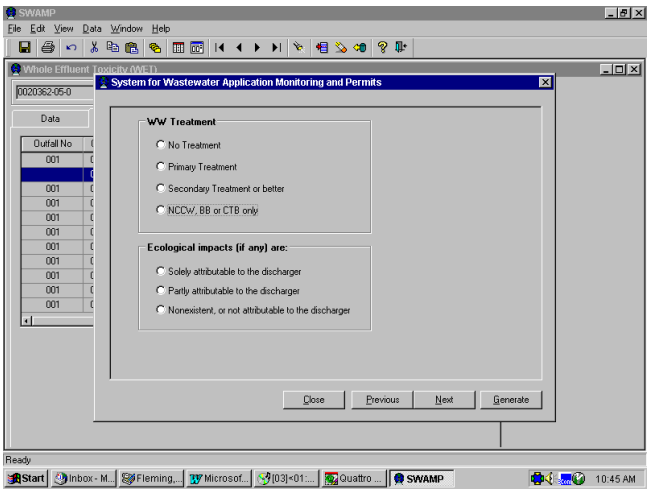
Industrial Contributors/Category: If the facility being evaluated is a municipality, the screen above will appear, asking for the number of industrial contributors. If the facility is industrial, the next screen will appear asking for the type of industrial discharger. (NOTE: In the screen below, points should be assessed only if the discharge contains PROCESS wastewater. Users should not include points for outfalls that contain only sanitary or other non-process wastewater.)



Data suggests that some categories have more potential for toxicity and that industrial contributors to municipal treatment plants increase their potential for toxicity. Staff should use BPJ when assigning points for "complex groundwater remediation", taking into consideration whether the discharge contains substances of concern and whether the size of the remediation causes more concern. Staff should also use BPJ to assign points to dischargers that do not fall strictly into one of the above categories. If staff feel that a discharger warrants the same points as one of the categories above, based on toxicity potential related to discharge type, they should assign points accordingly.

POINTS ASSESSED (Acute & Chronic)

Type	***Points***
Municipalities	***5 pts for 1st + 1 for ea. additional, not to exceed 15***
Groups in bullets 1-3	***15***
Groups in 4th bullet	***10***
Groups in 5th bullet	***8***
Groups in 6th and 7th bullets	***5***
Groups in last bullet	***0***



Wastewater Treatment: Untreated wastewater has a higher potential for toxicity. If combined outfalls are being addressed and treatment differs, the most conservative points should be given (for example, if 1 is treated & the other isn't, 10 points should be given for the untreated wastewater). The Checklist does not give points to the discharge if the 4th category is chosen. Staff should assign points here for all dischargers that do not have wastewater treatment (including those with cooling water, COW water, etc.). In those situations where staff feel that points accumulated here are not entirely appropriate because the discharge would not otherwise warrant wastewater treatment, they should use their BPJ to make adjustments to final monitoring recommendations (staff should NOT "adjust" points here by not assessing points for having no treatment). **Adjustments to final recommendations should be justified, shared with the Biomonitoring Coordinator, and well documented so that others can tell why decisions were made.**

POINTS ASSESSED (Acute & Chronic)

Type	***Points***
No Treatment	***10***
Primary Treatment Only	***8***
Secondary or Better	***0***
NCCW, Boiler or Cooling Tower Blowdown	***0***

Ecological Impacts: In situations where aquatic populations are under stress due to poor ecological conditions, toxicity from an effluent has a greater potential of causing environmental harm. Stressed individuals and populations may be less able to adapt or adjust to a toxic effluent. Therefore, impacted areas may be more susceptible to toxicity, more severe impacts may occur to populations that are already stressed due to existing conditions, and past discharge problems may cause populations to be more sensitive to toxicity. Since aquatic populations that are stressed by water quality impacts may be more sensitive and susceptible to a toxic effluent, it is appropriate to assign more monitoring to discharges that occur in areas where these concerns exist, to assure that toxicity is not occurring.

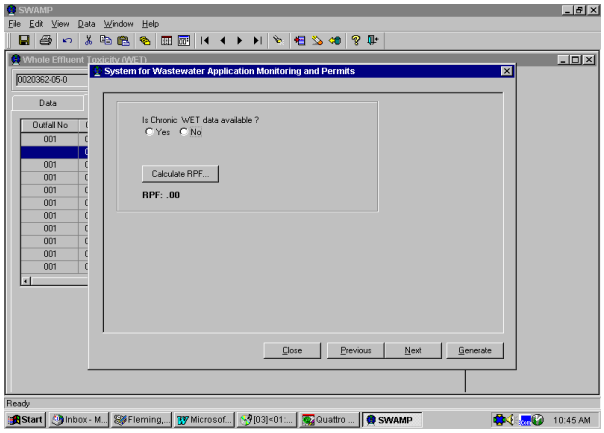
The second question in the screen above is designed to account for situations where data shows that a facility has contributed to problems (for example, effects on benthic, macrophytic, aquatic organism populations, fish kills, etc.) in the receiving water. More points are given to those that are thought to be the sole source causing an ecological impact; less are given to those who may be only a partial contributor. Water quality impacts caused by compounds typically characterized as "toxics" may be the easiest to determine points for in this category. However, staff should also consider situations where impacts may be present that are not necessarily caused by toxics. For example, low dissolved oxygen levels or impacts due to excessive nutrient levels may also cause concern in these situations. Staff should determine whether past receiving water problems have been addressed and assign points accordingly.

POINTS ASSESSED (Acute & Chronic)

Type	*Points*
Impacts solely due to discharger	***20***
Impacts contributed to by discharger	***5***
No impacts known	***0***

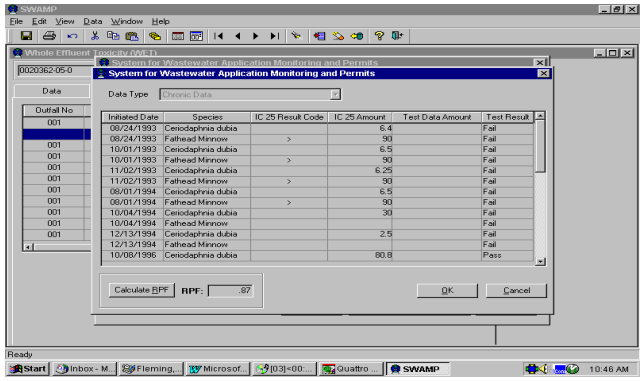
If it isn't necessary to evaluate chronic frequencies due to dilution (see p. 12), the Checklist ends here.

Chronic Toxicity:



Historical Data and RPF:

In the screen above, the user states whether there is representative chronic WET data available for the discharge being evaluated, then clicks on "Calculate RPF" if data is available, in order to choose the data that is to be used to calculate the chronic RPF. **Points should be assigned here if no <u>representative</u> data has been generated for the discharge in the last 5 years.** If no data is available, the chronic RPF = 0 and adds 5 points. This is done because more uncertainty exists in situations where testing has not been done than at those facilities that have produced data which shows toxicity problems have not been a concern. If no data is available, the Checklist proceeds to the "chronic WQBEL" screen (on page 25). If data is available, it proceeds to the next screen.



WET limits are required according to s. NR 106.08(5), Wis. Adm. Code., as follows: *"Whole effluent toxicity limits shall be imposed in a WPDES permit whenever the RPF calculated according to par. (b) exceeds 0.3. Whole effluent toxicity limits may be imposed, on a case-by-case basis, whenever facility-specific whole effluent toxicity test data indicate toxicity to aquatic life as determined in s. NR 106.09. Whole effluent toxicity limits may also be imposed in the absence*

of facility-specific whole effluent toxicity test data, on a case by-case-basis, whenever facility-specific or site-specific data or conditions indicate toxicity to aquatic life that is attributable to the discharger."

The Checklist uses data selected in the screen above to calculate a chronic Reasonable Potential Factor (RPF). Reasonable potential is defined as where an effluent "*is projected or calculated to cause an excursion above a water quality standard*". WET limits should be given whenever representative, facility-specific data shows the effluent may be discharged at a level that has the potential to cause or contribute to an excursion above a WET criterion. A chronic RPF is calculated using the data entered by the user according to the following equations, as required in s. NR 106.08: "*The RPF for chronic toxicity shall be calculated as follows: RPF = Geometric Mean of rTU_c values x Failure Rate*", where rTU_c = IWC/I_{25} and the failure rate = (Representative Tests Failed/Representative Tests Conducted). (NOTE: rTU_c = IWC/IC_{25}; IC_{25} > IWC = 1.0 rTU_c). Example RPF calculations are attached at the end of this chapter.

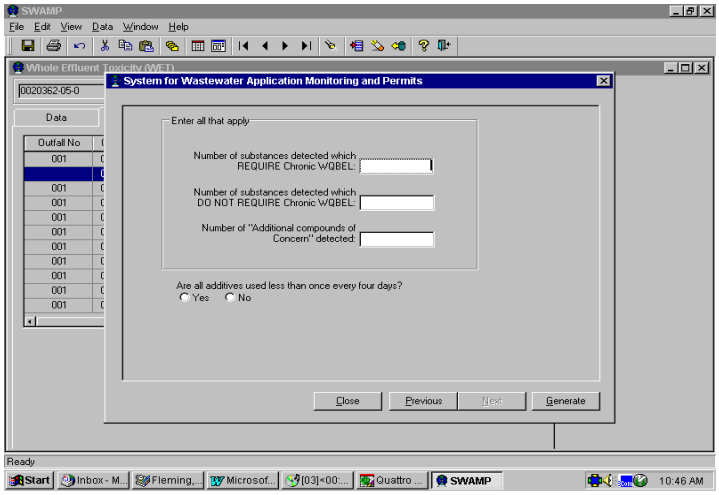
Which data to use. When first opened, the WET data that appears in the screen above will include all data for that outfall in the WET Database. IC_{25}s are given in the IC_{25} column. The user then selects representative WET data that should be used in the RPF calculation, by highlighting one species from each test date that is to be used (remember: only 1 most sensitive species from each test date should be selected). Once the most sensitive species from each representative test has been highlighted, the user clicks the "calculate RPF" button to determine the RPF value.

See "Most sensitive species", "Tests using only one species" and "Limits must be given to permittees who have an RPF $\geq$ 0.3." sections on p. 16. The same principles apply to the selection of chronic data as that described in those sections for acute data. Compliance schedules requiring toxicity reduction are usually placed in permits with new WET limits. Example compliance schedule language can be found in Chapter 1.12 (http://dnr.wi.gov/topic/wastewater/documents/Chap1x12WETLimitCompScheds.pdf).

POINTS ASSESSED (Chronic only)

#TESTS	***RPF***	***POINTS***
NONE	***0***	***5***
1-4	***< 0.1***	***0***
	$\geq$ 0.1, but < 0.2	***5***
	$\geq$ 0.2, but < 0.3	***10***
	$\geq$ 0.3	***15***
$\geq$ 5	***< 0.1***	***0***
	$\geq$ 0.1, but < 0.2	***10***
	$\geq$ 0.2, but < 0.3	***20***
	$\geq$ 0.3	***30 pts & a limit is required***

Chemical Specific Data – Chronic:



Water quality criteria are designed to be protective of aquatic life for the compounds that they limit. However, chemical-specific limits are not designed to account for additive or synergistic effects that chemicals may have when combined in an effluent. WET testing is used to determine whether these effects are occurring. The more compounds present, the greater the potential is for additive or synergistic effects to occur. Staff should document which limits and/or detects were considered so it is clear to others why point totals were assigned. Substances present at levels that cause chronic concerns (even if chronic limits are not given because acute limits are more restrictive) should be counted. For lists of substances found in ch. NR 105, Tables 3 & 4 (i.e., substances which may require chronic WQBELs), and for a table of "Additional Compounds of Concern", see attachment 2 at the end of this chapter. NOTE: As mentioned in attachment 2, ammonia limits should be counted only if representative effluent data demonstrates the need for a WQBEL (limits that are simply "carried over" from a previous permit term, even though effluent data suggests they are no longer needed, should not be counted as WQBEL limits). However, if ammonia has been detected in the effluent, it should be counted in that category.

POINTS ASSESSED (Chronic only)

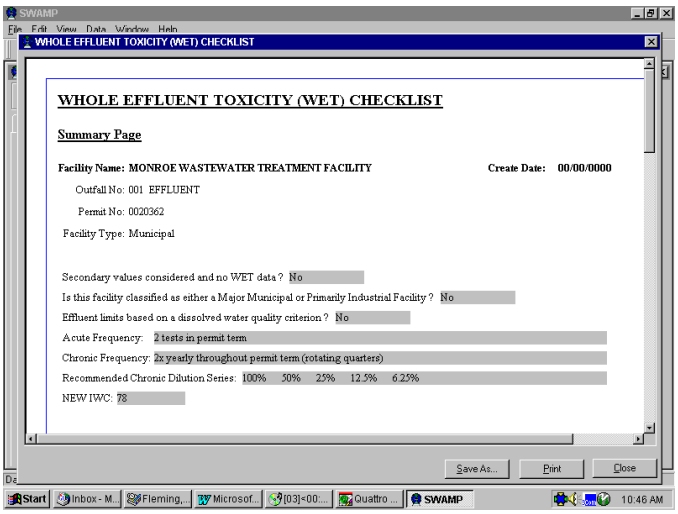
Answer	***Points***
Chronic WQBELs	***5 for 1st + 1 for ea. additional, not to exceed 10 pts.***
Detects w/out WQBELs	***1 for 1st + 1 for add. not to exceed 3***
Additional Cmpds of Concern	***2 (for ≥ 1 substance)***

Additives: Are all additives used less than once every four days? Additives used less than once every 4 days are not assessed points for chronic testing because less potential for chronic impacts is believed present. If a "No" is given here, the points assessed are based on the answers given previously in the biocides/water quality conditioners screen.

POINTS ASSESSED (Chronic only)

Answer	***Points***
YES	***0***
NO	***same points as acute (see p. 18)***

Recommendations: Once answers to the questions in the screen above have been given, the user clicks on the "Generate" button to complete the checklist and give a complete summary showing answers given, point totals, and monitoring and limit recommendations:



The Checklist is then complete and the summary page shows recommendations for acute and chronic limits and monitoring based on the totaled points, the calculated IWC, and the appropriate chronic dilution series recommended for the discharge. These recommendations should be considered by WQBEL, Basin Engineer, Permits, and other staff when making decisions regarding WET monitoring and limit requirements to be placed in the reissued WPDES permit.

The Checklist is intended to apply in most situations, but there may be situations where the general assumptions it is based on may not apply and deviations from the suggested criteria will be necessary. Decisions that are made contrary to the recommendations made by the Checklist should be discussed with the Biomonitoring Coordinator and clearly documented, so others can tell why decisions were made.

MONITORING FREQUENCIES

Point Totals	Checklist Monitoring Recommendation	Comments
≤ 14 (ACUTE) **≤ 19 (CHRONIC)**	**No WET Tests Recommended**	WET testing is not usually recommended, since the potential for effluent toxicity appears to be low.
15 - 24 (ACUTE) **20 - 24 (CHRONIC)**	**2 tests**	Two tests per 5 year term are recommended, since a few factors are present which cause concern. In order to insure that testing continues until a new permit is in place, testing should be required at least every other year until the permit is reissued (i.e., year 2, year 4, year 6, etc.). Tests should be required in different seasons, if possible.
25 - 34	**3 tests**	3 tests per 5 year term are recommended, due to a modest level of concern about toxicity. In order to insure that testing continues until a new permit is in place, testing should be required at least every other year until the permit is reissued (i.e., year 1, year 3, year 5, year 7, etc.). Tests should be required in different seasons, if possible.
35 - 44	**1x yearly**	One test is recommended each year during the permit term, due to a moderate level of concern about toxicity. Tests should be performed once each year, in successive quarters.
45 - 64	**2x yearly**	Two tests are recommended for each year during the permit term, due to a medium level of concern about toxicity. Tests should be performed during the 1st & 3rd quarters in odd numbered years and the 2nd & 4th quarters in even numbered years.
65 - 84	**Quarterly**	Quarterly testing is recommended, due to a significant level of concern about effluent toxicity. Facilities that fall into this category may have data that shows toxicity to be present. Tests should be performed at least 60 days apart.
≥ 85	**Bimonthly**	Testing every other month is recommended each year during the permit term, due to a substantial level of concern about toxicity. Facilities that fall into this category often have historical data that shows toxicity to be present, and possibly data which shows an environmental impact has occurred due to the discharge. Tests should be performed at least 30 days apart.

WET testing should continue at the appropriate frequency until the permit is reissued. When failures occur permits will require retests, usually 2 tests within 90 days. Every effort should be made to schedule original tests so retests may occur within the required period (e.g., if quarterly monitoring is required, tests should be done in the first month of the quarter so retests can be performed in the 2nd and 3rd months and not interfere with the next quarter's testing). According to permit requirements, retests cannot be accepted as fulfilling the requirement for the following period's testing.

Exceptions/special cases. Regardless of point totals, the following are true (see discussion of each on pp. 9-10):

- If a limit is given, at least quarterly monitoring is recommended.
- If major municipal or primary industrial, **at least** annual acute & chronic (based on dilution) is recommended.

- If secondary values are being considered and no WET data is available, **at least** 2x annual acute and chronic (need for chronic is based on dilution) is recommended.
- If WQBELs are given based on dissolved water quality criterion, **at least** annual acute & chronic is recommended.

UW-Madison State Laboratory of Hygiene (SLH) Biomonitoring Lab

For situations where the Checklist recommends little or no monitoring, but staff suspect problems may exist, the SLH Biomonitoring Laboratory is available for testing outside of the permit. Tests conducted by the SLH may be used by the WDNR to determine whether a problem exists or to generate additional data for use in WET determinations, but **cannot** be used as a replacement or credit towards permit-required testing. The SLH Biomonitoring Lab serves as a source of research, technical expertise, and WET compliance inspection testing for the WDNR. You may contact the Biomonitoring Coordinator or the State Lab (608-224-6230) to request a toxicity test.

REASONS FOR CHANGING MONITORING FREQUENCIES

At times, there may be reason to delay WET testing until later in the permit term or reasons for deviating from Checklist recommendations. Some reasons for changing WET recommendations are given below. As stated before in this chapter, Checklist recommendations are intended to apply in most situations, but there may be situations where the general assumptions it is based on may not apply and deviations from the suggested criteria will be necessary. Changes to Checklist recommendations should be justified, shared with the Biomonitoring Coordinator, and well documented so that others can tell why decisions were made.

Previous permit's tests. Tests that were required but not completed (postponed due to TIE, retests not done, etc.) during the last term should be added to the next permit term's recommendations.

Delay at permit reissuance. A period of 1-3 months may be allowed between reissuance and the 1st test to give the permittee time for scheduling. Other reasons may exist (for example, WWTP modifications, etc.) which may warrant a delay between reissuance and WET testing. Staff should use BPJ to determine when these situations may exist.

Seasonal discharges. If the discharge is sporadic or seasonal, tests should occur when the factors of concern listed in the Checklist are present (for example, during additive use, when waste is present, etc.), and therefore may not occur during different seasons. If the discharge does not occur long enough in a given year for the recommended frequency to be completed, consideration may be given to reduce the frequency accordingly. Additional guidance regarding monitoring frequencies and sampling schedules for seasonal or intermittent dischargers is given in Chapter 1.6 http://dnr.wi.gov/topic/wastewater/documents/Chap1x6IntermittentDischarges.pdf).

> 4 Miles from non-variance classified waterbody / > 100:1 dilution. As discussed earlier in this chapter and in Ch. 1.2 (http://dnr.wi.gov/topic/wastewater/documents/Chap1x2RWUse.pdf), chronic monitoring may not be recommended if the discharge is located > 4 miles from the nearest downstream non-variance classified waterbody or if available dilution is high. However, it is important to realize that this may not be appropriate in all situations. If data exists which suggests a high potential for chronic toxicity (for example, if previously performed chronic WET tests have failed), it may be necessary to require chronic monitoring to insure that receiving water impacts are not occurring. If staff feel there may be sufficient reason to require chronic monitoring in these situations they should contact the Biomonitoring Coordinator to discuss the situation and clearly document their reasons for deviating from the guidance so that others can understand why decisions were made.

Groundwater remediation and other remediation type discharges. For discharges of this type, testing should begin as soon as possible after discharge commences (first test usually within 90 days).

WWTP Upgrades. If a compliance schedule in the permit requires an upgrade, process change, or WWTP expansion that is expected to significantly change effluent toxicity, WET monitoring may be postponed until construction is complete. The WET Checklist should be completed based on WET data and toxicity potential as it exists at the time of permit issuance (since it is necessary for the permittee to demonstrate that the upgrade has reduced their potential).

Compliance Schedules/Toxicity Reduction Evaluations. See Chapter 1.12 (http://dnr.wi.gov/topic/wastewater/documents/Chap1x12WETLimitCompScheds.pdf) for guidance regarding WET compliance schedules. See Chapter 2.2 (http://dnr.wi.gov/topic/wastewater/documents/Chap2x2TREs.pdf) for guidance regarding the design and conduct of a TRE.

Permit Modifications/Permit Terms < 5 years. The WET Checklist was designed for assessing dischargers at the time of permit reissuance, therefore recommended monitoring frequencies are intended for a regular 5 year permit term. Staff may use the Checklist during permit modifications or when permits are to be reissued for shorter than 5 year terms to assess a discharge's toxicity potential, however, BPJ should be used to adjust recommended monitoring frequencies to fit into the term of the reissued or modified permit. For example, if a modification is occurring with only 1 year left in the permit term and 3 tests are recommended, staff should determine whether 3 tests should be done in that last year or if 1 or 2 tests would be sufficient to characterize the toxicity of the discharge.

Water Quality Variances. It may be appropriate to modify monitoring frequencies, test methods, or other WET requirements when a permittee has been granted a variance for a toxic compound (e.g., when a variance is allowed for chloride, see Chapter 2.10 at: http://dnr.wi.gov/topic/wastewater/documents/Chap2x10ChlorideWET.pdf) which may cause effluent toxicity. Changes to frequencies, test methods, or pass/fail requirements should only be allowed if the permittee can demonstrate to the Department that the substance for which they were granted a variance is the only source of toxicity (i.e., they are not exempt from other toxicity sources). All proposed changes due to variances should be discussed with the Biomonitoring Coordinator and clearly documented in the permit or WQBEL file so that others can tell why changes were made.

WET Limits as an Alternative to Secondary Values. Section NR 106.07(7)Adm. Code, states that The Department may establish a WET limitation according to s.NR 106.09 as an alternative to a chemical specific water quality-based effluent limitation based on a fish and aquatic life secondary acute or secondary chronic value determined according to ss.NR 105.05(4) and 105.06(6). The alternative whole effluent toxicity limitation shall meet all the following conditions:

1. The fathead minnow (Pimephales promelas) or the cladoceran Ceriodaphnia dubia were represented in the toxicological database used to generate the secondary value;
2. The permittee has requested the alternative whole effluent toxicity limitation; and
3. Whole effluent toxicity testing required in the permit shall be conducted at a frequency to be determined by the Department, but at least once every three months during the entire term of the permit.

Deficiency Toxicity. Deficiency toxicity is defined as a condition where organisms are unable to survive because the surrounding water is lacking the necessary ions (e.g., sodium, calcium, magnesium, potassium, etc.) that must be available for them to survive. The opinion of many biologists is that deficiency toxicity presented in an effluent toxicity test will not have deleterious effects on receiving water organisms, as long as the necessary ions are introduced as soon as the effluent contacts receiving water, soils, or sediments. If it can be demonstrated that positive WET results are due to deficiency toxicity only, it is reasonable to allow WET monitoring frequencies to be reduced. The following guidance is provided for those who wish to make such a demonstration:

In order to show that toxicity is caused by deficiency toxicity, the following may be demonstrated:

1. Hardness (as $CaCO_3$) in the unaltered sample (i.e., the wastewater as it is discharged) is < 45 mg/l;
2. Mortality in the *Ceriodaphnia dubia* test, in unaltered sample, is > 50%; and
3. The permittee has WET data, involving *C. dubia*, from at least 2 tests that includes the following:
   a) parallel tests with unadjusted vs. adjusted (to 45 mg/l hardness) sample, using reagents that have been added proportionally according to Table 1.3A below;

TABLE 1.3A RECIPE FOR EFFLUENT SAMPLE HARDNESS ADJUSTMENT			
REAGENT ADDED (mg/l)			
$NaHCO_3$	$CaSO_4H_2O$	$MgSO_4$	KCl
48.0	30.0	30.0	2.0

   b) Tests should include 4 replicates of at least 5 organisms in each; and
   c) The observed mortality in the altered sample is ≤ 10%.

If staff believe that deficiency toxicity exists, language may be placed in the permit allowing for a study similar to that above and for the dropping of WET monitoring after a successful demonstration. This demonstration should be made for each reissuance (exemptions from WET testing should only apply to one permit term).

Historically, it was believed that deficiency toxicity was responsible for WET results that were shown with condensate of whey (COW) discharges. Since the wastewater in these situations was thought to be only made up of condensate, the necessary ions were believed absent. In 1994-95, a study was conducted at the State Laboratory of Hygiene (SLH), in cooperation with the WDNR and 17 dairies, in an attempt to identify the cause of COW water toxicity. Study results showed: 1 not acutely toxic, 4 acutely toxic due to deficiency toxicity, 4 acutely toxic due to deficiency toxicity and ammonia, and 8 acutely toxic for unknown reasons (i.e., it was not deficiency or ammonia toxicity). Based on these results, it is obvious that it is necessary to continue to evaluate the potential for WET in COW water, however, we may allow COW water dischargers to demonstrate that WET results are impacted by deficiency toxicity, as described above.

Example Permit Language for COW discharges: The following language may be used to allow demonstrations in COW discharge permits: *"If discharges consisting of condensate of whey (COW) wastewater only or non-contact cooling water mixed with COW waters (NCCW/COW) pass the first two acute toxicity tests and the first two chronic toxicity tests (if chronic toxicity testing is required) then the permittee is not required to perform additional toxicity testing during this permit term. If positive toxicity is experienced in any of the first two acute or chronic toxicity tests, the permittee may attempt to demonstrate that toxicity is due to ion deficiency. If it can be demonstrated that ion deficiency is the sole cause of toxicity in at least two consecutive positive tests, and the Department agrees in writing, the permittee will not be required to perform additional toxicity testing during this permit term. If it cannot be demonstrated that ion deficiency is the sole cause of toxicity in these tests, the permittee must complete the remaining toxicity tests."*

Reasonable potential (RP) procedures in Great Lakes permits. The USEPA has stated their opinion that the WET RP procedures described in ch. NR 106, Wis. Adm. Code, and earlier in this chapter are not "as protective as" the WET RP procedure in the Great Lakes Water Quality Implementation Guidance (March 1995). USEPA defined "as protective as" as meaning it is possible that a WPDES permit in the Great Lakes basin might not receive a WET limit based on an evaluation using ch. NR 106 WET RP procedures, but a WET limit would be required using GLI procedures. The differences in these WET RP procedures are as follows:

1) The DNR's WET RP procedure does not require a limit when there are less than 5 historical WET data for a given facility. The GLI WET RP process does not contain a minimum data requirement.

2) The DNR WET RP procedure is based on a "reasonable potential factor" (RPF), which is calculated based on the percent (i.e., tests failed/total tests completed) and severity (geometric mean of Toxic Units) of failures that have occurred for a given facility. Generally, a WET limit is given according to the DNR WET RP procedure when a facility has experienced unacceptable toxicity in 25% or more of historical, representative WET tests.

   DNR procedure:
   Permittee gets limit when: (geometric mean TU)(% failures) ≥ 0.3 and > 5 representative data

3) WET limits are given to discharges in the Great Lakes basin according to the GLI whenever the maximum TU in the dataset > 1.0 (i.e., whenever a "failure" exists in the dataset). Basically, every facility in the Great Lakes Basin that experiences 1 or more failures must get a WET limit (unless they have > 70 data and a CV > 0.6).

   GLI procedure:
   Permittee gets a WET limit when: (maximum TU)(B) > 1.0 TU
   Where B is a "safety factor" and is ≥ 1.0, unless there are 70+ data for the facility

As a result of EPA's objections to the differences in these two policies, revisions to ch. NR 106, Wis. Adm. Code, may be needed. Until ch. NR 106 is revised, dischargers **in the Great Lakes basin** should be evaluated based on the procedures found in ch. NR 106 and GLI WET RP procedures.

- If neither RP procedures in ch. NR 106 nor GLI WET RP procedures warrant the inclusion of acute or chronic WET limits in the permit, then nothing additional is needed in the permit and the permit may be issued as scheduled.

- If the RP procedures in ch. NR 106 warrant the inclusion of an acute and/or chronic WET limit(s) in the permit, the permit should be written to include the appropriate WET limit(s), as described in ch. NR 106 and this chapter, appropriate compliance schedule language given (see Chapter 1.12 - http://dnr.wi.gov/topic/wastewater/documents/Chap1x12WETLimitCompScheds.pdf), and the permit may be issued as scheduled.

- If the RP procedures in ch. NR 106 do not warrant the inclusion of a WET limit in the permit, but GLI WET RP procedures do require the inclusion of a WET limit, the permit will have to be placed on hold (backlogged) until WET RP issues can be resolved. Permits reissued under these circumstances without a WET limit could be objected to by EPA (since it would not meet GLI requirements). Permits reissued under these circumstances with a WET limit would likely be objected to by the permittee (since Department rules do not allow this).

  In these cases, additional WET monitoring may help to resolve toxicity issues (e.g., if changes have been made at the WWTP and additional data can be used to clarify whether or not older failures are still representative). **Staff should discuss these situation with the Biomonitoring Coordinator to determine if there are actions that can be taken to resolve the WET RP situation and reissue the permit.**

ATTACHMENT 1:
Examples Demonstrating Use of RPF Equations

LC_{50} data available: RPF = geometric mean of the TU_a x %failure (TU_a=100/LC_{50} & an LC_{50}>100 = 1 TU_a).

Test Number	Most Sensitive Species LC_{50}	TUa	Pass/Fail
1	100%	1.0	P
2	50%	2.0	F
3	100%	1.0	P
4	75%	1.33	F
5	75%	1.33	F
6	100%	1.0	P
		Geometric mean = 1.23	50% failures

Acute RPF = 1.23 x .50 = .62; **Facility A would get an acute WET limit (i.e., the RPF > 0.3).**

"Mixed" data: RPF = geo.mean S x %Failure; S=(50/x) & x=50 if the % effluent $\geq$50, or 5 if %effluent $\leq$5, or %survival if <50 and >5

Test Number	Most Sensitive Species % Surv. in 100% effluent	X	S	Pass/Fail
1	100%	50	1	P
2	50%	50	1	P
3	10%	10	2.236	F
4	75%	50	1	P
5	75%	50	1	P
6	5%	5	3.162	F
		geometric mean = 1.38		33% failures

Acute RPF = 1.38 x .33 = 0.457; **Facility A would get an acute WET limit (i.e., the RPF > 0.3).**

"ZID" data: RPF = Failure Rate

Test Number	*Pass/Fail*
1	*P*
2	*P*
3	*F*
4	*P*
5	*P*
	20% failures

Acute Reasonable Potential Factor = .20; **Facility A would not get a WET limit (i.e., the RPF < 0.3).**

IC_{25} data: RPF = geometric mean of the rTU_c's x %failures (rTU_c = IWC/I_{25}; IC_{25} > IWC = 1 rTU_c).

test number	Most sensitive species IC_{25}	RTU_c	Pass/Fail
1	90%	1.0	P
2	40%	2.13	F
3	85%	1.0	P
4	90%	1.0	P
5	87%	1.0	P
6	85%	1.0	P
	IWC = 85%	geometric mean = 1.13	16.7% failures

Chronic Reasonable Potential Factor = 1.13 x .17 = .19; **Facility B would not get a chronic WET limit (i.e., the RPF < 0.3).**

ATTACHMENT 2:
Toxics in NR 105 and the "Additional Compounds of Concern (ACC)" Table

CATEGORY	SUBSTANCES	
	ACUTE	CHRONIC
WQBEL required 5 pts for 1st + 1 for each additional, not to exceed 15 pts.	Ammonia[1], Arsenic, Cadmium, Chloride, Chlorine, Chlorpyrifos, Chromium, Copper, Cyanide, Dieldrin, Endrin, Gamma-BHC, Lead, Mercury, Nickel, Parathion, Pentachlorophenol, Toxaphene, Zinc	Ammonia[1,2], Arsenic, Cadmium, Chloride, Chlorine, Chromium, Copper, Cyanide, Dieldrin, Endrin, Lead, Mercury, Nickel, Parathion, Pentachlorophenol, Zinc
Substance detected, but no WQBEL needed 1 point each, not to exceed 3 pts	Substances above detected in the effluent (including those given chronic WQBEL), but not given acute WQBEL	Substances above detected in the effluent (including those given acute WQBEL), but not given chronic WQBEL
"Additional Compounds of Concern" detected 2 points given if any detected	Any substances in "Additional Compounds of Concern" table below detected in the effluent	Any substances in "Additional Compounds of Concern" table below detected in the effluent

[1] Ammonia limits should be counted only if representative effluent data demonstrates the need for a WQBEL (limits that are simply "carried over" from a previous permit term, even though effluent data suggests they are no longer needed, should not be counted as WQBEL limits). If ammonia has been detected in the effluent, it should be counted as described in the second row of the table above.

[2] Ammonia WQBELs based on 4-day chronic toxicity criteria and expressed in permits as weekly average limitations should be counted. WQBELs based on 30-day criteria and expressed as monthly averages are not indicative of conditions in chronic WET tests (since chronic tests last 7 days) and should not be counted. If ammonia has been detected in the effluent, it should be counted as described in the table above.

Information given above is from Tables 1 & 2 (acute) and Tables 3 & 4 (chronic), in ch. NR 105, Wis. Adm. Code, March 2004. Users may want to check for more recent versions of this code to make sure that they are using the most up-to-date lists if much time has elapsed since the last chapter revision.

ADDITIONAL COMPOUNDS OF CONCERN (ACC)

Metals:
Antimony
Beryllium
Selenium
Silver
Thallium

Volatile Organic Compounds:
Acrolein
Acrylonitrile
Benzene
Bromoform
Carbon Tetrachloride
Chlorobenzene
Chlorodibromomethane
Chloroethane
2-Chloroethyl vinyl ether
Chloroform
1,2-Cisdichloroethylene
Dichlorobromomethane
1,1-Dichloroethane
1,2-Dichloroethane
1,1-Dichloroethylene (vinylidene chloride)
1,2-Transdichloroethylene
1,2-Dichloropropane
1,1-Dichloropropene
2,3-Dichloropropene
1,3-Dichloropropene
Ethylbenzene
Methyl Bromide
Methyl Chloride
Methylene Chloride
1,1,2,2-Tetrachloroethane
Tetrachloroethylene
Toluene
1,1,1-Trichloroethane
1,1,2-Trichloroethane
Trichloroethylene
Vinyl Chloride

Acid-Extractable Compounds:
P-Chloro-M-Cresol
2-Chlorophenol
2,4-Dichlorophenol
2,4-Dimethylphenol
4,6-Dinitro-O-Cresol
2,4-Dinitrophenol
2-Nitrophenol
4-Nitrophenol
Phenol
2,4,6-Trichlorophenol

Base-Neutral Compounds:
Acenaphthene
Acenaphthylene
Anthracene
Benzidine
Benzo(a)anthracene
Benzo(a)pyrene
3,4-Benzofluoranthene
Benzo(ghi)perylene
Benzo(k)fluoranthene
Bis(2-chloroethoxy)methane
Bis(2-chloroethyl)ether
Bis(2-chlorisopropyl)ether
Di(2-ethylhexyl)phthalate (DEHP)
4-Bromophenyl Phenyl Ether
Butyl benzyl phthalate
2-Chloronaphthalene
4-Chlorophenyl Phenyl Ether
Chrysene
Dibenzo(a,h)anthracene
1,2-Dichlorobenzene
1,3-Dichlorobenzene
1,4-Dichlorobenzene
3,3'-Dichlorobenzidine
Diethyl Phthalate
Dimethyl Phthalate
Di-n-butyl Phthalate
2,4-Dinitrotoluene
2,6-Dinitrotoluene
Di-n-octyl Phthalate
1,2-Diphenylhydrazine
Fluoranthene
Fluorene
Hexachlorobenzene
Hexachlorobutadiene
Hexachlorocyclopentadiene
Hexachloroethane
Indeno(1,2,3-cd)pyrene
Isophorone
Naphthalene
Nitrobenzene
N-Nitrosodimethylamine
N-Nitrosodiphenylamine
N-Nitrosodipropylamine
N-Nitrosodiethylamine
N-Nitrosodi-n-butylamine
N-Nitrosopyrrolidine
Octachlorostyrene
Pentachlorobenzene
Phenanthrene
Pyrene
1,2,3,4-Tetrachlorobenzene
1,2,4,5-Tetrachlorobenzene
1,2,4-Trichlorobenzene

Pesticides:
Aldrin
Alpha-BHC
Beta-BHC
Delta-BHC
Chlordane
Chlorpyrifos
4,4'-DDD
4,4'-DDE
4,4'-DDT
Diazinon
2,4-Dichlorophenoxyacetic acid
Endosulfan
Endosulfan Sulfate
Endrin Aldehyde
Guthion
Heptachlor
Heptachlor Epoxide
Malathion
Methoxychlor
PCBs

Dioxin:
2,3,7,8-TCDD (dioxin)

Other Non-Priority Pollutants:
Aluminum
Asbestos
BHC-tech. grade
Bis(2-chloromethyl)ether
3-Chlorophenol
4-Chlorophenol
Dichlorodifluoromethane
2,3-Dichlorophenol
2,5-Dichlorophenol
2,6-Dichlorophenol
3,4-Dichlorophenol
1,3-Dichloropropane
2,3-Dinitrophenol
Fluoride
Formalin
Iron
2-Methyl-4-Chlorophenol
3-Methyl-6-Chlorophenol
Mirex
Photomirex
2,3,4,6-Tetrachlorophenol
Trichlorofluoromethane
2,4,5-Trichlorophenol

ATTACHMENT 3:
Summary of WET Checklist Questions

The following is a summary of the questions asked and points assessed in the WET Checklist. This summary is intended as a guide for determining what information will be needed to complete the electronic version of the Checklist or for sharing information with others. ***This summary is not intended to replace the electronic (SWAMP) version of the Checklist***. Instructions are included in the preceding chapter.

ACUTE RECOMMENDATIONS	CHRONIC RECOMMENDATIONS
IWC Not Applicable for acute	IWC: (≤ 35% = 0 pts; 36 - 65% = 10 pts; > 65% = 15 pts)
	POINTS: (maximum possible = 15)
Acute WET Data Reasonable Potential Factor: ***With ≥ 5 data points:*** *0 points If < 0.1* *10 points If ≥ 0.1, but < 0.2* *20 points If ≥ 0.2, but < 0.3* *30 points If ≥ 0.3* ***With < 5 data points:*** *0 points If < 0.1* *5 points If ≥ 0.1, but < 0.2* *10 points If ≥ 0.2, but < 0.3* *15 points If ≥ 0.3* **If ≥ 5 test results and the RPF ≥ 0.3, a limit is recommended**	**Chronic WET Data** Reasonable Potential Factor: ***With ≥ 5 data points:*** *0 points If < 0.1* *10 points If ≥ 0.1, but < 0.2* *20 points If ≥ 0.2, but < 0.3* *30 points If ≥ 0.3* ***With < 5 data points:*** *0 points If < 0.1* *5 points If ≥ 0.1, but < 0.2* *10 points If ≥ 0.2, but < 0.3* *15 points If ≥ 0.3* **If ≥ 5 test results and the RPF ≥ 0.3, a limit is recommended**
POINTS: (maximum possible = 30)	**POINTS:** (maximum possible = 30)
Effluent Variability/WWTP Performance 1. Are production processes or plant loadings variable? ____ Yes (5 pts) ____ No 2. Is there a history of permit violations? ____ Yes (5 pts) ____ No 3. Is any treatment present? ____ Yes ____ No 4. Is the discharge solely of nccw, ccw, bb, or ctb? ____ Yes ____ No (If **both** 3 & 4 = YES, 10 pts; If either is NO = 0 pts.)	**SAME POINTS AS ACUTE**
POINTS: (maximum possible = 10)	**POINTS:** (maximum possible = 10)
WWTP Performance (cont.) Is there a history of frequent or severe WWTP upsets? ____ Yes (5 pts) ____ No Are WWTP operations inconsistent? ____ Yes (5 pts) ____ No	**SAME POINTS AS ACUTE**
POINTS: (maximum possible = 10)	**POINTS:** (maximum possible = 10)
Stream Classification Discharge is to : ___ L. Superior or an Outstanding Resource Water (15 pts) ___ an Exceptional Resource Water (12 pts) ___ a FFAL or to waterbody w/in 4 mi of an FFAL (5 pts) ___ a variance receiving water (0 pts)	**SAME POINTS AS ACUTE**
POINTS: (maximum possible = 15)	**POINTS:** (maximum possible = 15)
Chemical Specific Data - Acute No. of substances which require Acute WQBEL: _____ No. substances detected which do not require WQBEL: _____ No. of "Additional Compounds of Concern" detected: _____	**Chemical Specific Data - Chronic** No. of substances which require Chronic WQBEL: _____ No. substances detected which don't require WQBEL: _____ No. of "Additional Compounds of Concern" detected: _____
POINTS: (maximum points = 15)	**POINTS:** (maximum points = 15)
Additives How many Biocides are Used? _____ (3 pts. each) How many Water Quality Cond. are used? _____ (1 pt. each)	**SAME AS ACUTE** unless additives are never present more than once in 4 days (0 pts)
POINTS: (maximum possible = 20)	**POINTS:** (maximum possible = 20)
Industrial Contributors/Discharge Category **MUNICIPAL** How many ICs discharge process waste & appear on the lists below? **or** **INDUSTRIAL** Select type from the appropriate category below: ___Electroplating; Fe & steel or nonferrous metals mfg. or forming; Metal Finishing; Coil coating; Cu or Al forming; Battery mfg.; Foundries; Mines; Mechanical products (15 pts) ___Petroleum refining (15 pts) ___Pulp, paper, paperboard mfg.; Timber products processing (15 pts) ___Organic/Inorganic chemicals mfg.; Tanning & finishing; Agricultural chemicals mfg; Ethanol production; Pharmaceutical; Plastic/synthetics mfg; Soap & detergent mfg; Textiles; Adhesives & sealants mfg; Paint & ink formulation; Photographic equipment; Printing/publishing; Rubber processing (10 pts) ___Superfund or Environmental Repair Fund (ERF) Sites, complex groundwater remediations (8 pts) ___Steam electric power generating (5 pts) ___Food processors; dairies (including COW); cancooling; meat packers; fish hatcheries (5 pts) _____**None or discharge does not contain process waters (0 pts)**	**SAME POINTS AS ACUTE**

ATTACHMENT 3:
Summary of WET Checklist Questions

ACUTE RECOMMENDATIONS	CHRONIC RECOMMENDATIONS
POINTS: (maximum possible = 15)	**POINTS:** (maximum possible = 15)
Wastewater Treatment No Treatment (10 pts) Primary Treatment Only (Primary clarification or physical removal) (8 pts). Secondary Treatment or better (0 pts) NCCW, Boiler or cooling tower blowdown only (0 pts)	**SAME POINTS AS ACUTE**
POINTS: (maximum possible = 10)	**POINTS:** (maximum possible = 10)
Ecological impacts Impacts are thought to be solely attributable to discharge (i.e., evidence is available which implicates discharger) (20 pts) Impacts are contributed to by the discharge, but not solely caused by the discharge (5 pts) No evidence of downstream impacts attributable to discharge (0 pts)	**SAME POINTS AS ACUTE**
POINTS: (maximum possible = 20)	**POINTS:** (maximum possible = 20)
TOTAL POINTS, ACUTE =	**TOTAL POINTS, CHRONIC =**

RECOMMENDED MONITORING FREQUENCIES

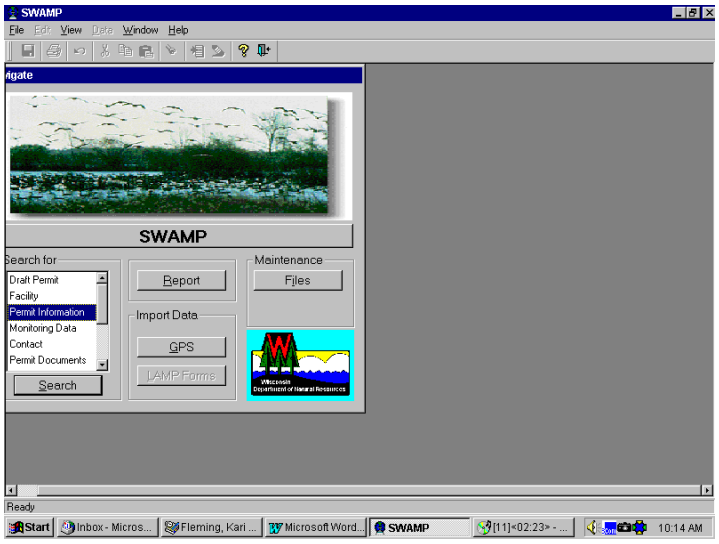
ACUTE TOTAL	RECOMMENDED ACUTE MONITORING FREQUENCY	CHRONIC TOTAL	RECOMMENDED CHRONIC MONITORING FREQUENCY
0 - 14	No WET tests needed	0 - 19	No WET tests needed
15 - 24	1 test every other year (e.g., year 2, year 4, year 6, etc.) (rotating quarters)	20 - 24	1 test every other year (e.g., year 2, year 4, year 6, etc.) (rotating quarters)
25 - 34	1 test every other year (e.g., year 1, year 3, year 5, etc.) (rotating quarters)	25 - 34	1 test every other year (e.g., year 1, year 3, year 5, etc.) (rotating quarters)
35 - 44	1x yearly throughout term (rotating quarters)	35 - 44	1x yearly throughout term (rotating quarters)
45 - 64	2x yearly throughout term (rotating quarters)	45 - 64	2x yearly throughout term (rotating quarters)
65 - 84	Quarterly throughout term	65 - 84	Quarterly throughout term
$\geq$ 85	Bimonthly throughout term	$\geq$ 85	Bimonthly throughout term

Exceptions/special cases. Regardless of point totals, the following are true (see discussion of each in Chapter 1.3, pp. 8-9):

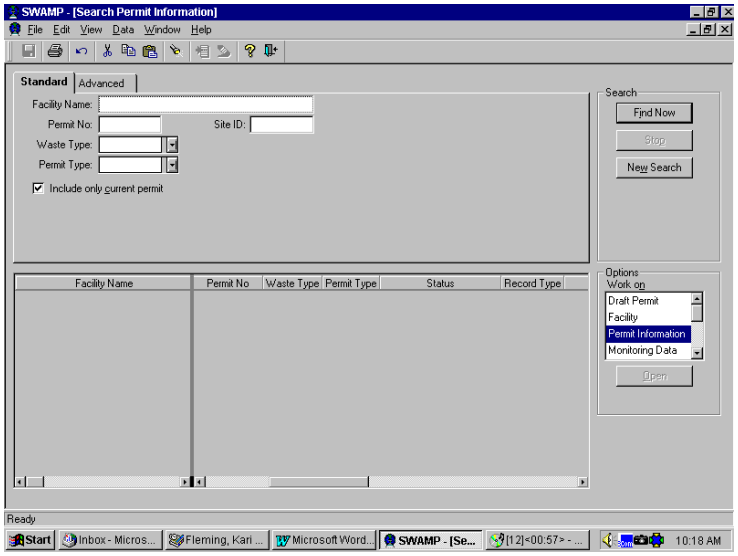
1) If a limit is given, at least quarterly monitoring is recommended.
2) If the facility is a major municipal or primary industrial, **at least** 1x annual acute and chronic (need for chronic is based on dilution) is recommended.
3) If secondary values are being considered and no WET data is available for the discharge, **at least** 2x annual acute and chronic (need for chronic is based on dilution) is recommended.
4) If WQBELs are given which have been based on a dissolved water quality criterion, **at least** 1x annually acute and chronic is recommended.
5) If the discharge is entirely noncontact cooling water, contact cooling water, boiler blowdown, and/or cooling tower blowdown and no NR105 or "Additional Compounds of Concern" were detected, Ch 1.7 should be used to determine WET recommendations.
6) If the discharge is $\geq$ 4 miles from a non-variance classified waterbody, chronic testing may not be recommended.

ATTACHMENT 4:
Changing Data in the Sample Point Table
(data to be used by WET Checklist in IWC calculations)

In order for the WET Checklist to make decisions regarding the instream waste concentration (IWC), stream flow to effluent flow ratios, and other WET determinations, information regarding effluent flow (Qe), the fraction of Qe withdrawn from the receiving water (RW), RW flow ($Q_{7,10}$), and RW classification must be entered in the "Sample Point" table. This information must be entered before creating a new Checklist or revising an existing Checklist. This attachment includes instructions on how to enter this data into the Sample Point table.



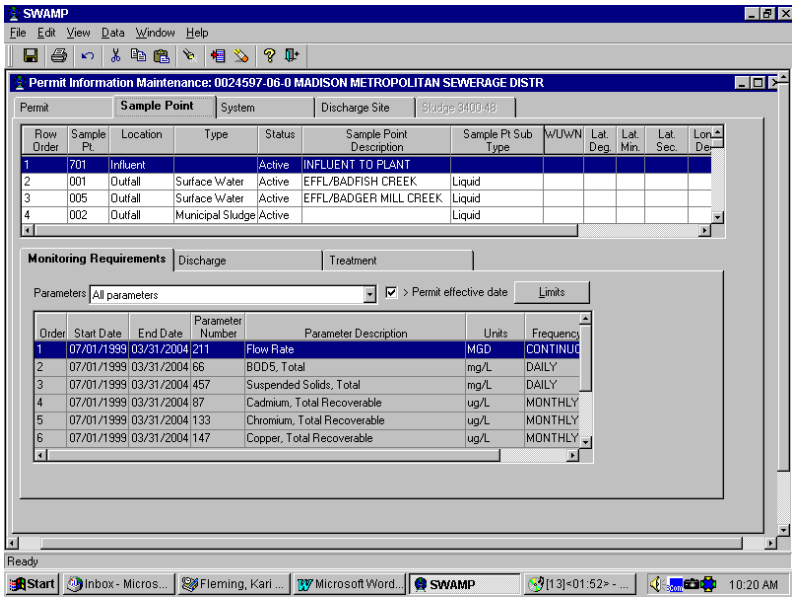
At the Navigate screen, click on "Permit Information" in the "Search for:" box, then click on the "Search" button.



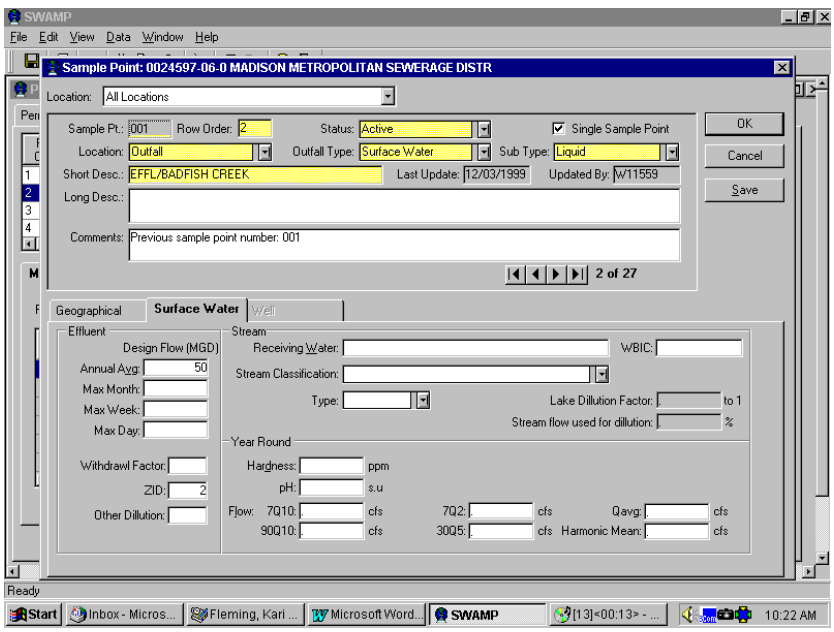
When this "Search Permit Information" screen appears, enter the facility name, FIN, Site Id, or permit number and then click on the "Find Now" button. The facility name and permit number will appear in the "Facility Name" box on the bottom half of the screen. Click on the name or permit number for the facility you are interested in and then click on the "Open" button.

In the "Permit Information Maintenance" screen (below), click on the "Sample Point" tab.

ATTACHMENT 4:
Changing Data in the Sample Point Table
(data to be used by WET Checklist in IWC calculations)



Double-click on the surface water outfall that you are interested in, then click on the "surface water" tab.



The effluent flow (Q_e) used in the WET Checklist is usually the annual average design flow for municipals or average annual actual flow for industrial dischargers. The Checklist will use this Q_e to determine the appropriate $Q_{7,10}$:Q_e ratio, IWC, and chronic dilution series (more discussion of these values are given later in this chapter). The withdrawal factor (f) should be entered as a decimal (for example, if the facility withdraws and uses 1/2 of the receiving water flow, enter 0.5). This value will be used as "f" in the IWC calculation (discussed later in this chapter). The $Q_{7,10}$ entered here is also used to determine the $Q_{7,10}$:Q_e ratio (used to determine need for acute and/or chronic testing), IWC, and to choose the chronic dilution series. Once the Qe, Q7,10, and f values are entered in the sample point table, return to the previously discussed screen in the WET Checklist.