Internal Management Directive

Reasonable Potential Analysis Process for Toxic Pollutants Version 3.1

State of Oregon
Department of Environmental Quality

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Section 1: Introduction

1.1 Purpose of Directive

The purposes of this Internal Management Directive (IMD) are to provide guidance for Department of Environmental Quality (DEQ) staff in determining whether an individual point source discharge (point source) contains toxic *pollutants of concern* (POCs) that might cause an exceedance of the water quality standard in the receiving water body, and how to calculate effluent limits. The current water quality criteria for aquatic toxicity are listed in OAR 340-41 pollutant tables 20, 33A and 33B, and for human health water quality criteria in OAR 340-41 pollutant table 40. The IMD provides step-by-step guidance for identifying POCs, conducting the Reasonable Potential Analysis (RPA), calculating Water Quality Based Effluent Limits (WQBELs), and discusses various technical and policy issues.

All of the RPA steps and calculations have been consolidated into a series of spreadsheets (**RPA Workbook**). When conducting the RPA, the permit writer uses these spreadsheets to determine the discharger's monitoring requirements, identify POCs, calculate reasonable potential and if necessary, develop effluent limits. This document follows along with the spreadsheets, and provides basic instruction for each step and, where necessary, offers detailed technical and regulatory guidance.

It is recommended that readers should first familiarize themselves with the **RPA Workbook** and refer to it while reading through this document. This includes reading through the **Appendix D: RPA Workbook Walk-Through and Example**.

1.2 Directive Applicability

State and Federal regulation require that a RPA must be conducted for all proposed and existing industrial and domestic NPDES individual point source dischargers. The number and type of pollutants for which the RPA must be conducted will vary with the size, type and potential hazard of the facility. This process is explained in detail in **Section 2**.

1.3 Overview of Permit Process

For most major domestic and industrial point sources, DEQ permit writers review permit applications, perform water quality-based modeling, review laboratory test results, develop effluent limits (where applicable) and incorporate their findings into permits to ensure that the discharge of pollutants (i.e. toxic, nutrients, pH, BOD, etc.) do not result in violations of water quality standards. Some minor facilities require an equivalent degree of analysis, but typically for a greatly reduced number of toxic pollutants. These processes are usually repeated every five years upon permit renewal. The RPA for toxic pollutants is often the most technically involved portion of the permit development

process.

The Department has developed the following guidance documents that describe the parts of the permit development process that relate to the subjects covered in this document:

- **Anti-Degradation Policy Implementation IMD**
- **Compliance Schedules in NPDES Permits IMD**
- **Regulatory Mixing Zone IMD: Part 1 Allocating Regulatory Mixing Zones**
- **Regulatory Mixing Zone IMD: Part 2 Reviewing Mixing Zone Studies**

1.4 Key Definitions

- *Reasonable Potential Analysis* (RPA) is the process for determining "whether a discharge causes, has reasonable potential (RP) to cause, or contributes to an excursion above" Oregon's water quality criteria for toxic pollutants (in the receiving water body).
- *A Pollutant of Concern* (POC) is a toxic pollutant that has been statistically evaluated and identified as having a "reasonable potential" to exceed the state water quality criteria (at the end of pipe).
- *Water Quality Based Effluent Limit* (WQBEL) is an effluent limitation determined by selecting the most stringent of the effluent limits calculated using all applicable water quality criteria (i.e. human health or aquatic toxicity) for a specific point source to a specific receiving water.
- *Permit Evaluation Report (PER)* is a document that summarizes the principal facts and the significant factual, legal, methodological, and policy question considered in preparing the draft permit and documents the decisions. The PER is also referred to as a "Fact Sheet" and the various requirements are covered under 40 CFR 124.8 and 124.56.
- *Tier 1 Monitoring* is a series of at least four sampling events designed to characterize a facility's effluent and identify POCs. Each sample collected is subjected to laboratory analysis for a broad spectrum of pollutant parameters as determined by the permit writer.
- *Tier 2 Monitoring* is a second round of sampling (for identified POCs only) necessary to characterize the receiving water and provide additional effluent characterization. Tier 2 monitoring will enable the permit writer to model the impacts of a discharge upon the receiving waters, and complete the RPA. Generally, if the results of Tier 1 monitoring indicate that there is no reasonable potential for the discharge to exceed water quality standards at the end of the pipe, then Tier 2 monitoring is not needed.

1.5 Overview of the Reasonable Potential Analysis

To paraphrase EPA's *Technical Support Document for Water Quality-based Toxics Control*, a RPA is the process for determining "whether a discharge causes, has reasonable potential to cause, or contributes to an excursion above" Oregon's water quality criteria for toxic pollutants. Before conducting a RPA, a permit writer should first review any applicable Total Maximum Daily Loads (TMDLs) to determine if there are already facility-specific waste load allocations (WLA)[1]. The permit writer would then

[1] If indicated, the permit writer should confer with the TMDL development section or Basin Coordinator to ensure that the TMDL is sufficiently protective and that the underlying assumptions have not changed.

continue with the RPA process described in **Figure 1-1** and **1-2** for any pollutants not specifically addressed in a TMDL.

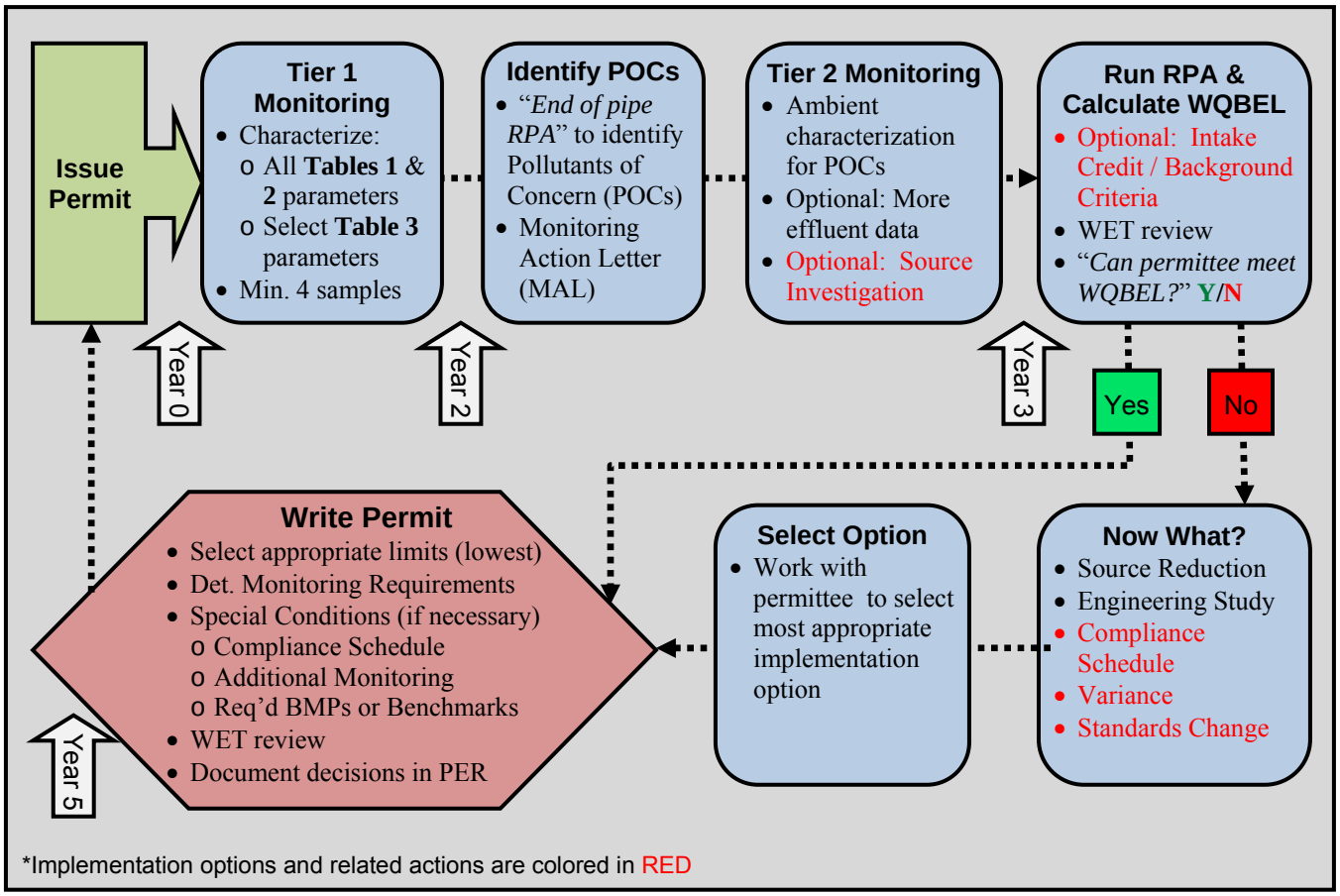
Figure 1-1
Permit Development and RPA Process Overview

- **Step 1**: As part of the preceding permit development, the permit writer develops a list of effluent monitoring requirements based upon the facility and receiving water classifications. **Section 2 (RPA IMD)**
- **Step 2**: During the first 24 months of the new permit term, the permittee conducts the required pollutant scan (Tier 1 Monitoring). **Section 2**
- **Step 3**: Using the Tier 1 data, the permit writer initially characterizes the effluent and identifies POCs using the **Aquatic Toxicity RPA** and **Human Health RPA** spreadsheets of the **RPA Workbook** to conduct an "end of pipe" reasonable potential (RP) determination. **Section 3**
- **Step 4**: The permit writer will report the identified POCs, associated monitoring requirements and recommendations to the permittee via Monitoring Action Letter (MAL). By the end of the month 36, for each POC the permittee will characterize the receiving water body, and (optionally) collect additional effluent or source investigation data (Tier 2 monitoring). **Section 4**
- **Step 5**: The permit writer will use the Tier 1 and 2 data, along with other information, to model the potential in-stream water quality impacts and complete the "in-stream" RP determination. This may include the use of an intake credit analysis as part of the determination. **Section 5**
- **Step 6**: For each POC found to have RP (in-stream), information will be transferred from the RPA spreadsheets to the **Aquatic Limits** and **Human Health Limits** spreadsheets to calculate a Water Quality Based Effluent Limit (WQBEL). This may include the use of rule-based intake credits in the limit calculation. The permit writer would normally include this limit in the permit unless a more stringent Technology Based Effluent Limit (TBEL) is applicable. **Section 6**
- **Step 7**: The permit writers will discuss the results of the RPA with the applicants. If the facility is not capable of initially meeting the effluent limit, the permittee may use the remainder of the permit term (~24 months) to collect additional information, attempt source reduction, develop treatment options, or justify a variance request or standards adjustment. In some cases, a Compliance Schedule may be granted, allowing the permittee additional time to implement source reduction or treatment options to meet the final effluent limit. **Section 7**
- **Step 8:** After receiving the EPA permit application forms (month 54), the permit writer would use the remaining time (six months) to finalize the RPA and WQBEL calculations, and then document their findings, interim calculations and management decisions in the Permit Evaluation Report. The permit would then be ready for re-issuance. **Section 8**

For new permit applications or permits where adequate monitoring data are not available to conduct a quantitative RPA, permit writers should use their best professional judgment to determine the most appropriate ways to characterize the facility and model the in-stream impacts. This might include the use of representative data or the use of an alternative qualitative RPA methodology as described in EPA guidance[2]. Please refer to **Sections 4.2.1** and **5.4** of this document for more information.

Once the RPA and calculation of WQBELs is complete, a summary of the analysis and results is documented in the PER. To complete the permit development process, the permit writer will conduct a Whole Effluent Toxicity (WET) review, and where necessary, increase the stringency of the effluent limits or permit conditions. A summary of the RPA process is included in **Figure 1-2** below.

Figure 1-2
RPA Process w/Timeline and Implementation Options



[2] **Technical Support Document for Water Quality-based Toxics Control,** Section 3.2, P. 50.

1.6 Sources of Information

The following is the typical information a permit writer must review to characterize the facility, effluent and the receiving waters. Most of the following are typically submitted by the permit applicant. In some cases, the permit writer will need to request or collect additional information.

Domestic Facilities:

- Permit application forms
  - EPA *Forms 1* and *2A* (new permit)
  - EPA *Forms 2A* and OR DEQ Form *NPDES-R* (permit renewal)
  - *Bio-solids Plan*
- Characterization and monitoring data as required by application form, permit and/or permit writer request
- *Discharge Monitoring Reports* (DMRs), with a focus on the adequacy of detection limits for non-detectable values[3]
- *Pretreatment Industrial Surveys* or required information per 40 CFR 122.21 (j)(6).
- *Total Maximum Daily Load Reports*: Many facilities that discharge to 303(d) listed stream segments will be described and receive waste load allocations in TMDL Reports
- *303(d)* listings for receiving stream segment
- *Oregon DEQ LASAR* ambient data for the applicable waterbody segment

Industrial Facilities:

- Permit application forms[4]
  - EPA *Form 1 & 2D* (new permit)
  - EPA *Form 2C* and OR DEQ Form *NPDES-R* (permit renewal)
- Characterization and monitoring data as required by application form, permit or permit writer request
- *Discharge Monitoring Reports* (DMRs), with a focus on the adequacy of detection limits for non-detectable values
- *Total Maximum Daily Load Reports* (TMDL): Many facilities that discharge to 303(d) listed stream segments will be described and receive waste load allocations in TMDL Reports
- *303(d)* listings for receiving stream segment
- *Oregon DEQ LASAR* ambient data for the applicable receiving stream segment
- Design and process flow data
- Hazardous material inventories (SARA Title III, RCRA, State Fire Marshal records).

If the facility has a Regulatory Mixing Zone (RMZ), then a detailed mixing zone analysis should have been conducted. At minimum, the study should contain the dilutions values for the receiving water body and mixing zones under critical conditions. Please refer to

[3] Daily and weekly data for major facilities, in electronic form, is available to the permit writer through the Discharge Monitoring System (DMS). Often monthly, annual and sporadic data are also available.

[4] Other EPA application forms include 2E (facilities which do not discharge process wastewater), 2B (CAFOs and Aquatic Animal Production wastewater) and 2F (industrial stormwater only).

the ***Regulatory Mixing Zone Internal Management Directive*** for more information. The "dilution values" should be used instead of the effluent and ambient stream flow information in the RPA calculation. The permit writer can also contact the regional Plan Review Engineer for additional information regarding the appropriate flow value to use in the RPA that is consistent with critical conditions. . If no mixing zone analysis is available, it will be necessary to use the facility's *Design Flow*[5], along with critical effluent and ambient flow rates to calculate the available dilution using the **RPA Workbook**.

Additionally, the following documents provide in-depth discussions of the permitting process and methods used in modeling reasonable potential and calculating effluent limits:

- **Technical Support Document for Water Quality-based Toxic Control,** USEPA, March 1991 (**TSD**)
- **U.S. EPA NPDES Permit Writers' Manual**, USEPA, September 2010

Finally, the Department maintains a website that contains various guidance documents, analytical and modeling tools, state rules, pertinent forms and other permit writer resources at: http://deq05/wq/wqpermits/PermitWritersCorner.htm.

1.7 Questions and Contact Information

For questions about this guidance, contact the Surface Water Management Section in the Water Quality Division. At the time of release, the point of contact for this guidance is Spencer Bohaboy at (503) 229-5415 or mailto:bohaboy.spencer@deq.state.or.us.

[5] The flow that the facility was built to handle

Section 2: Tier 1 Monitoring

2.1 Tier 1 Monitoring Overview

The RPA process begins when the permit writer evaluates a facility to determine the spectrum of pollutant parameters that must be included in the permit monitoring requirements (**Step 1**). This pollutant scan is intended as a periodic check to determine if any of the pollutants historically associated with domestic or industrial facilities or for which the receiving water has been listed as water quality limited are present, and quantify the resulting concentrations[6]. Typically, this evaluation would occur during the preceding permit term so that the effluent monitoring requirements can be included in the **Schedule B** permit conditions[7].

For domestic facilities, the number and type of pollutants that require an RPA increases along with incremental (<0.1, 0.1 – 1.0, > 1.0 MGD) changes in the facility "design flow". There might also be additional monitoring requirements for facilities with special conditions such as the discharge of PCB's, pesticides or mercury. This is described in **Section 2.2.1** of this document.

For industrial facilities, the number and type of pollutants that require evaluation are determined by the facilities' design flow rates, industrial categories, hazardous production materials, receiving water's status and permitting history. This is described in **Section 2.2.2** of this document.

Upon permit renewal, the facility would implement their Tier 1 monitoring requirements by collecting at least **four** effluent samples that reflect the seasonal discharge characteristics (i.e. wet and dry) and have them analyzed for the specified pollutants. These actions must be completed by the 24th month of the permit term (**Step 2**).

Once collected and analyzed, the permit writer would then evaluate the resultant data and identify any POCs in the facility's effluent (**Step 3**) as described in **Section 3**.

2.2 Determination of Pollutants Requiring Evaluation

The process to evaluate a facility and identify monitoring requirements is complex and depends upon the type of facility. **Figures 2-3**, **2-4, 2-5** and the accompanying **Domestic Facility Pollutant Table** and **Industrial Facility Pollutants Table** walk the permit writer through the process to ensure that all federally and state mandated pollutant parameters are identified.

[6] This scan is in addition to any compliance-based effluent monitoring
[7] As part of the application for a new facility or extraordinary circumstances, a facility might be required by Permit Action Letter to conduct Tier 1 monitoring

Regardless of other factors, the following pollutant parameters must be analyzed in the RPA:

- Pollutant parameters with effluent limits in the preceding permit
- Pollutant parameters with monitoring requirements in the preceding permit[8]
- Pollutant parameters for which the receiving water body has been listed as "water quality limited" on the 303d list
- Pollutant parameters that are "known[9]" to be present in significant concentrations in a facilities' source/intake water
- Pollutant parameters that are "known" or otherwise expected to be present in significant concentrations in a facilities effluent
- Pollutant parameters identified through the permit application process and described in the rest of this Section

The **RPA Workbook** includes all the pollutant parameters that might need to be evaluated for a domestic or industrial facility, based upon state and federal guidelines. The permit writer will evaluate each parameter for inclusion in the analysis and record the result ("*Yes*" or "*No*") in the "*Monitoring Required?*" column of the **Monitoring Requirements** spreadsheet (See **Figure 2-1**)[10]. The permit writer should also document the facility's Average Dry Weather Design Flow (ADWDF) rate in the appropriate box of the same spreadsheet. Once the evaluation is complete, the permit writer can supply a copy of the worksheet to the permit applicant and include a summary of the Tier 1 monitoring requirements in **Schedule B** of the permit.

For a new permit application, the permit writer will identify the pollutant parameters that require monitoring during a pre-application conference, and the results will be submitted as part of the facility's application.

For the first round of permit renewals after implementation of this IMD, the permit writer will develop the permit based upon the available data and include the new monitoring and evaluation procedures into the permit's monitoring requirements (Schedule B).

At various points of the permit cycle (month 24 and permit renewal), the permit writer will have the opportunity to add additional monitoring requirements to reflect newly authorized water quality criteria or recent waterbody listings (303d). This is discussed in **Section 4.2**.

If WET testing is required, the permit writer should coordinate the testing to coincide with the Tier 1 monitoring. In the event of "toxicity" finding during the WET analysis, the simultaneous sampling will help with the required source investigation. Please refer to **Appendix E** (Whole Effluent Toxicity Guidance) or contact the Department's WET

[8] In some instances, such as a change in water quality criteria, change in treatment method (e.g. Cl^- to UV) or de-listing of a water body, a permit writer might determine that it is appropriate to not renew a permit monitoring requirement.
[9] For example intake water is from a 303(d) listed water body or contaminated groundwater.
[10] For some pollutant parameters, total data may be collected in lieu of species specific data for Tier 1 monitoring. In the event that the pollutant is identified as a POC, species specific may be collected as part of the Tier 2 monitoring.

coordinator for more information.

Figure 2-1
Example of Monitoring Requirements Determination Worksheet

Or. DEQ — Monitoring Requirements Determination Worksheet — Rev. 2.0
Domestic Permit

Domestic Facility Monitoring Requirements
Tier 1: Pollutant Scan

Facility Name:	Anytown POTW	Notes:
DEQ File Number:	12345	Evaluation based on preceding permit and updated facility report
EPA Identification Number:	abcdef	
Permit Writer Name:	Ivana Permit	
Outfall Number:	001	Permitee Instructions:
Determination Date:	5/27/2011	Please monitor for the following pollutant parameters and submit summay report by 6/1/2013
Facility ADWDF Rate (MGD):	10.1	

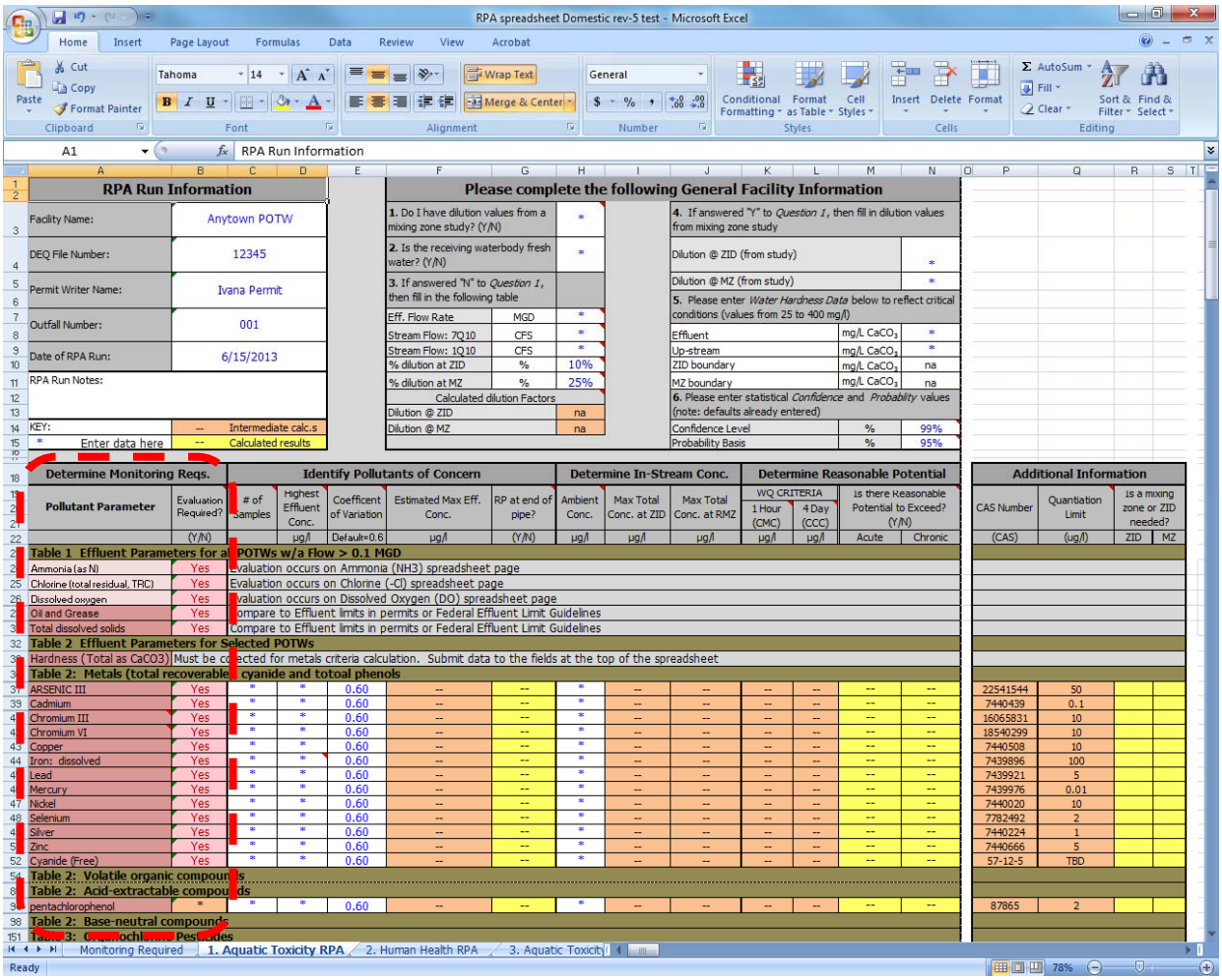
Pollutant Parameter	Monitoring Required? (Y/N)	# of Samples Req'd #s	CAS Number (CAS)	Quantiation Limit (ug/l)	Comments
Table 1 Effluent Parameters for all POTWs w/a Flow > 0.1 MGD					
Ammonia (as N)	Yes	4			
Chlorine (total residual, TRC)	Yes	4			
Dissolved oxygen	Yes	4			
Nitrates-Nitrite	Yes	4			
Kjeldahl nitrogen	Yes	4			
Oil and Grease	Yes	4			
Phosphorus, Total	Yes	4			
Total dissolved solids	Yes	4			
Table 2 Effluent Parameters for Selected POTWs					
Hardness (Total as CaCO3)	Yes	4			
Table 2: Metals (total recoverable), cyanide and totoal phenols					
Antimony	Yes	4	7440360	0.1	
Arsenic (Total)	Yes	4	7440382	0.05	
ARSENIC III	Yes	4	22541544	50	
Beryllium	Yes	4	7440417	0.1	
Cadmium	Yes	4	7440439	0.1	
Chromium	Yes	4	7440473	0.4	
Chromium III	Yes	4	16065831	10	May use Total Cr data as indicator, and collect species data in tier 2 monitoring
Chromium VI	Yes	4	18540299	10	May use Total Cr data as indicator, and collect species data in tier 2 monitoring
Copper	Yes	4	7440508	10	
Iron: dissolved	Yes	4	7439896	100	
Lead	Yes	4	7439921	5	
Mercury	Yes	4	7439976	0.01	
Nickel	Yes	4	7440020	10	
Selenium	Yes	4	7782492	2	
Silver	Yes	4	7440224	1	

7/26/2011 — Page 1 of 5 — RPA spreadsheet Domestic rev-5 test

Figure 2-1 Explanation
Determine Monitoring Requirements

1. The permit writer (PW) evaluates each facility to determine which pollutant parameters should be included in Tier One monitoring.
2. On the **Monitoring Required** spreadsheet, the PW records facility identification information and the ADWDF rate used for the evaluation.
3. The PW indicates with a "*Yes*" or "*No*" in the "*Monitoring Required*" column if monitoring is required as shown in **Figure 2-1**.
4. The information entered on the "**Monitoring Required?"** spreadsheet will automatically be forwarded to the **Aquatic Toxicity** and the **Human Health** Spreadsheets as shown in **Figure 2-2**.
5. The PW checks to ensure that all pollutant parameters listed on the spreadsheets have been evaluated and have either a "*Yes*" or "*No*" in the column.

Figure 2-2
Example of the RPA Workbook



2.2.1 Discussion of State and Federal Authority to Require Monitoring

The purpose of the RPA IMD is to direct DEQ permit writers on how to implement statutory and regulatory requirements for NPDES permitting. This IMD does not create any new authority but only implements existing authority. Following is a detailed discussion of these authorities.

Per 40 CFR 123.1, the Department has been delegated (by the EPA) to administer the Clean Water Act (CWA) and implement the NPDES program in Oregon (except for tribal lands). The Environmental Quality Commission has adopted water quality standards/criteria to protect the beneficial uses of the State's water bodies, as authorized by ORS 468B.048. These water quality standards/criteria become effective upon approval by the EPA.

OAR 340-045-0035(1) requires DEQ to develop permits "in accordance with provisions of all applicable statutes, rules, regulations, and effluent guidelines of the State of Oregon and the U.S. EPA." Per OAR 340-041-0033(2), the "*levels of toxic substances in waters of the state may not exceed the applicable criteria*…". Note, there are both federal and state water quality standards that permittees must meet.

To ensure that water quality standards applicable to the receiving water are met, the Department conducts a water quality based assessment[11] to determine if there is a reasonable potential for a discharge to cause or contribute to an exceedance, and where appropriate, define effluent limitations. The permittee must "*comply with the Department's requirements for …, reporting, monitoring, … and sampling"* (OAR 340-045-0015 (5)(d)).

Finally, per 40 CFR 123.25 (**Requirements for permitting**) and OAR 340-045-0065, the department must follow federal permit development and implementation procedures, including those described in 40 CFR 122.21 (***Application for a permit***) and 122.41(3)(h) (**Duty to provide information**). 40 CFR 122.21 directs the permittee to monitor for pollutant parameters, many of which are not reflected in Oregon's water quality criteria[12]. 40 CFR 122.41(3)(h) gives the Department the authority to request from the permittee any information to determine if "*cause exists for modifying, revoking and reissuing, or terminating this permit or to determine compliance with this permit."* When requesting a water quality variance, per OAR 340-041-0059(4)(c) the permittee must provide "*sufficient water quality data and analyses to characterize ambient and discharge water pollutant concentrations*".

To summarize, the department has been delegated to implement the NPDES program and develop state water quality standards. The department must ensure that permittees comply with these standards. In order to develop appropriate effluent limits in permits,

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[11] Based upon EPA's **TSD**

[12] Conversely, there are state water quality criteria w/no federal monitoring requirements. This is shown in the "*No Fed. Req's*" column of the "**RPA Workbook**, **Monitoring Required?**" page.

the department requires permittees to sample their effluent and, in some cases, the receiving water body. The department also incorporates monitoring requirements into the permit to verify that the permittees are meeting the applicable effluent limitations.

2.2.2 Domestic Facilities: Evaluation and Monitoring Requirements

Per 40 CFR 122.21(j)(4) and DEQ guidance[13], domestic facilities are required to monitor for specific pollutant parameters with a minimum frequency. The type of pollutants and the frequency varies based upon the facility's Average Dry Weather Design Flow (ADWDF)[14] in the following manner:

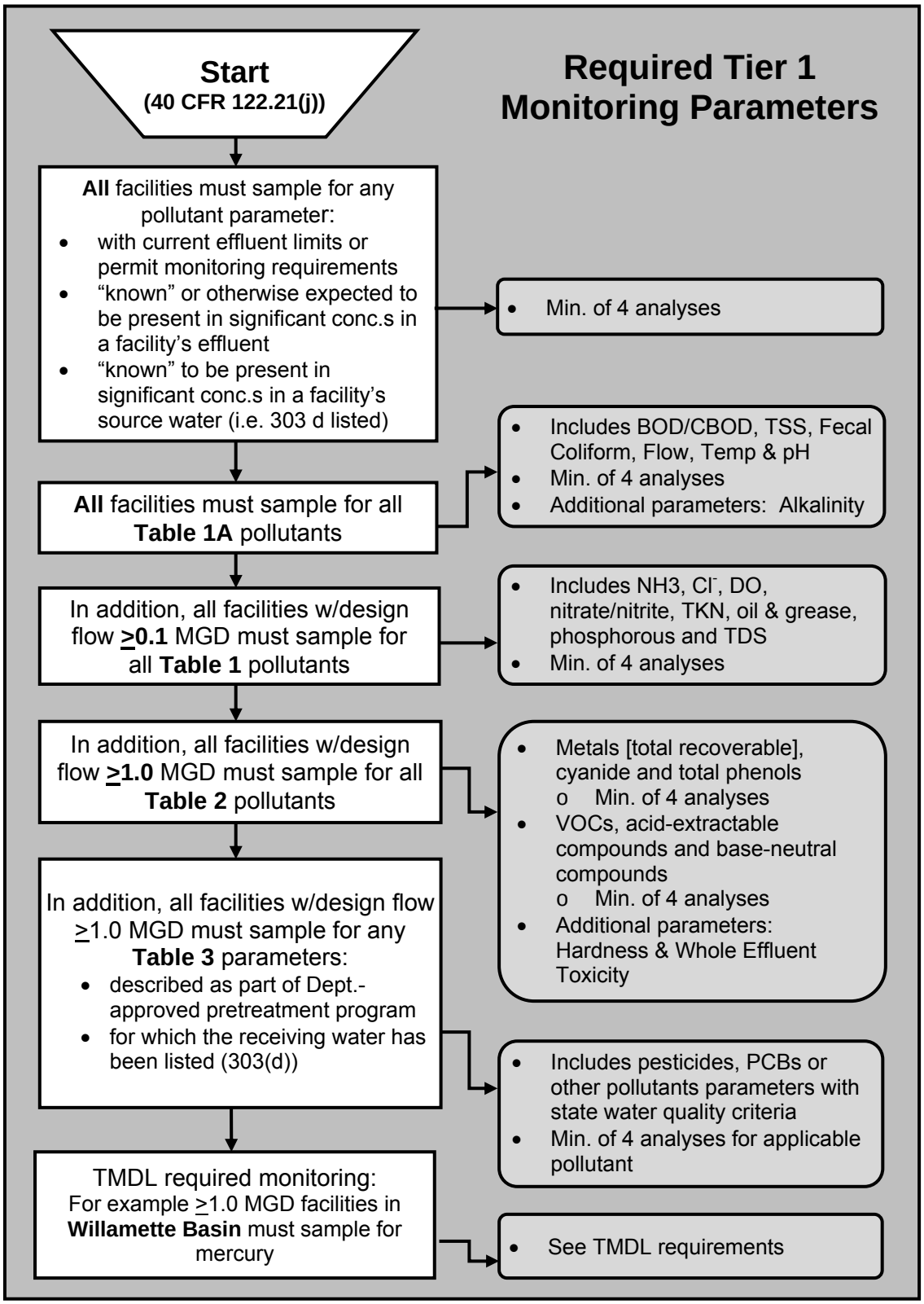
- For all domestic facilities with an ADWDF of at least 1 MGD, the permit writer must conduct an RPA for all identified toxic pollutants.
- For all domestic facilities with ADWDFs from 0.1 to less than 1 MGD, the permit writer must, at minimum, perform a RPA for chlorine and ammonia.
- A permit writer should conduct a RPA for all 303(d) listed toxic pollutants in the receiving stream for a domestic facility of less than 1 MGD, when the pollutants are "known" or are reasonably expected to present in the effluent[15].

The guidance in **Figure 2-3** (and **Domestic Facility Pollutant Tables**) walks the permit writer through the process of identifying the facility's monitoring requirements to meet both the requirements included in **EPA Application Form 2A,** and any additional state or federal requirements. The **Domestic Facility Pollutant Tables** in **Section 2.2.3** are taken from 40 CFR 122, App. J and EPA Application form 2A, and are augmented with any state water quality criteria[16] not reflected in these sources. The missing state water quality criteria have been inserted into the appropriate chemical group within **Tables 1A**, **1** and **2**, and would only require monitoring when the chemical group is indicated. The remaining water quality criteria have been consolidated into **Table 3**, where only those individual pollutants known to be present in the effluent or for-which the receiving water body has been listed (303d) as "water quality limited", would require monitoring.

The pollutant scan must occur within the first two years of a permit term and each sample must be taken between four and eight months apart in order to be representative of seasonal variation (i.e. wet and dry). When possible, monitoring should be coordinated with other requirements such as local-limit evaluation, compliance monitoring or WET testing, to increase the overall relevance of the analytic results and maximize efficiency. For a new permit application it might be necessary for the permit writer to conduct a qualitative assessment process (Qualitative RPA) when facility specific effluent monitoring data is not available. In these circumstances the permit writer should refer to guidance in the USEPA NPDES Permit Writers Manual[17] and EPA's TSD, p. 49.

[13] Letters entitled "Toxic Monitoring Requirements for Domestic Wastewater Treatment Plants with NPDES Permits" dated 1/6/2006.
[14] if necessary, the permit writer should consider the use of an alternative "critical" effluent flow for pollutants or discharge scenarios where there might be wet weather impacts.
[15] I.e., source water from listed water body, potential industrial pollutant sources w/in the collection area or contaminated ground water via I&I. Previously collected data may be used.
[16] State water quality criteria are from Federal recommended criteria (section 304 A of CWA).
[17] September 2010 revision, Section 6.3.3, Page 6-30.

Figure 2-3
Domestic Tier 1 Monitoring Requirements Determination Process



2.2.3 Domestic Facility Pollutant Tables

Tables 1A, **1** and **2** below are taken from *Appendix J* of *40 CFR, Part 122-NPDES permit Testing Requirements for Publicly Owned Treatment Works* (POTW). State water quality criteria not addressed by these documents are added to the tables in the appropriate chemical group[18], with the remaining criteria consolidated into **Table 3**. Please refer to **Figure 2-3** for assistance in determining applicable monitoring requirements.

Table 1A – Effluent Parameters for All POTWS	
Alkalinity as CaCO3 *	pH
Biochemical oxygen demand (BOD-5 or CBOD-5)	Temperature
Bacteria: (Fecal Coliform, E. Coli &/or Enterococci)	Total suspended solids
Design Flow Rate	

Table 1-Effluent Parameters for All POTWS w/a Flow ≥ 0.1 MGD	
Ammonia (as N)	Kjeldahl nitrogen (TKN)
Chlorine (total residual, TRC)	Oil and grease
Dissolved oxygen	Phosphorus (Total)
Nitrate/Nitrite	Total dissolved solids (TDS)

Table 2--Effluent Parameters for Selected POTWS	
Hardness (as CaCO3)	
Metals (total recoverable), cyanide and total phenols	
Antimony	Lead
Arsenic	Mercury
Arsenic (Inorganic) *	Nickel
Arsenic (III) *	Selenium
Beryllium	Silver
Cadmium	Thallium
Chromium	Zinc
Chromium (III) *	Cyanide (Free)*
Chromium (VI) *	Cyanide (Total)
Copper	Total phenolic compounds
Iron (Total) *	

[18] Please note that all parameters listed with a "*****" are state water quality criteria not listed in 40 CFR 122 or in the EPA application forms.

Table 2--Effluent Parameters for Selected POTWS (Continued)	
Volatile organic compounds	
Acrolein	1,1-dichloroethylene
Acrylonitrile	1,2-dichloropropane
Benzene	1,3-dichloropropylene
Bromoform	Ethylbenzene
Carbon tetrachloride	Methyl bromide
Chlorobenzene	Methyl chloride
Chlorodibromomethane	Methylene chloride
Chloroethane	1,1,2,2-tetrachloroethane
2-chloroethylvinyl ether	Tetrachloroethylene
Chloroform	Toluene
Dichlorobromomethane	1,1,1-trichloroethane
1,1-dichloroethane	1,1,2-trichloroethane
1,2-dichloroethane	Trichloroethylene
Trans-1,2-dichloroethylene	Vinyl chloride
Acid-extractable compounds	
P-chloro-m-cresol	2-nitrophenol
2-chlorophenol	4-nitrophenol
2,4-dichlorophenol	Pentachlorophenol
2,4-dimethylphenol	Phenol
4,6-dinitro-o-cresol	2,4,5-trichlorophenol *
Dinitrophenols *	2,4,6-trichlorophenol
2,4-dinitrophenol	
Base-neutral compounds	
Acenaphthene	3,3-dichlorobenzidine
Acenaphthylene	Diethyl phthalate
Anthracene	Dimethyl phthalate
Benzidine	2,4-dinitrotoluene
Benzo(a)anthracene	2,6-dinitrotoluene
Benzo(a)pyrene	1,2-diphenylhydrazine
3,4 benzofluoranthene	Fluoranthene
Benzo(ghi)perylene	Fluorene
Benzo(k)fluoranthene	Hexachlorobenzene
Bis (2-chloroethoxy) methane	Hexachlorobutadiene
Bis (2-chloroethyl) ether	Hexachlorocyclo-pentadiene
Bis (2-chloroisopropyl) ether	Hexachloroethane
Bis (2-ethylhexyl) phthalate	Indeno(1,2,3-cd)pyrene
Bis (Chloromethly) ether *	Isophorone
4-bromophenyl phenyl ether	Naphthalene
Butyl benzyl phthalate	Nitrobenzene
2-chloronaphthalene	N-nitrosodi-n-propylamine
4-chlorophenyl phenyl ether	N-nitrosodimethylamine
Chrysene	N-nitrosodiphenylamine
Di-n-butyl phthalate	Pentachlorobenzene *
Di-n-octyl phthalate	Phenanthrene
Dibenzo(a,h)anthracene	Pyrene
1,2-dichlorobenzene	1,2,4-trichlorobenzene
1,3-dichlorobenzene	1,2,4,5-Tetrachlorobenzene *
1,4-dichlorobenzene	

Table 3 – Pesticides, PCBs and Other Parameters w/Water Quality Criteria	
Organochlorine Pesticides*	
Aldrin	Endosulfan I (Alpha)
Technical-BHC (Hexachlorcyclo-hexane)*	Endosulfan II (Beta)
alpha-BHC	Endosulfan *
beta-BHC	Endosulfan sulfate
delta-BHC	Endrin
gamma-BHC (Lindane)	Endrin aldehyde
Chlordane (tech)	Heptachlor
Chloropyrifos	Heptachlor epoxide
Dementon	Malathion
4,4´-DDD	Methoxychlor
4,4´-DDE	Mirex
4,4´-DDT	Parathion
Dieldrin	Toxaphene
PCBs*	
Total PCBs **	
**A Total PCBs analysis is determined by monitoring for PCB Aroclors 1016,1221,1232,1242, 1248, 1254 and 1260 in one sample event and totaling the values.	
Other Parameters with Sate Water Quality Criteria*	
Barium, Total	Guthion
Manganese, Total	Nitrosamines
Sulfide-Hydrogen Sulfide	N-Nitrosodibutylamine
2,4,5-TP [2-(2,4,5-Trichlorophenoxy) propanoic acid]	N-Nitrosodiethylamine
2,4-D (2,4-Dichlorophenoxy acetic acid)	N-Nitrosopyrrolidine
Dioxin 2,3,7,8-TCDD	Phosphorus, Elemental

2.2.4 Industrial Facilities: Evaluation and Monitoring Requirements

Per 40 CFR 122.21 and DEQ guidance[19], industrial facilities are required to monitor for specific parameters with a minimum frequency. The monitoring requirements at a specific facility are determined based upon industrial category, pre-existing permit status, hazardous material present, new source performance standards or permit writer discretion[20]. The guidance in **Figures 2-4** and **2-5** (and **Industrial Facility Pollutant Tables I**, **II**, **III and IV**[21]) walks the permit writer through the process of identifying the facility's monitoring requirements to address both the requirements included in **EPA Forms 2C**[22], **2D**[23] and **2E**[24], and any additional state or federal requirements. **Figure 2-4**

[19] Letters entitled "Toxic Monitoring Requirements for Industrial Wastewater Treatment Plants with NPDES Permits" dated January 6, 2006.
[20] e.g., discretion might include known environmental concerns in the receiving waters or industrial category that could impact, or be impacted by the facility's activity.
[21] **Tables II, III, IV** contains pollutant parameters that require monitoring and analysis if required or expected to be present. **Table V** contains pollutant parameters that would require identification only (no monitoring) if they are expected to be present.
[22] Existing manufacturing, commercial, mining and silvicultural dischargers, 40 CFR 122.21(g)
[23] New Sources and New Dischargers per 40 CFR 122.21(k)
[24] Facilities Which Do Not Discharge Process Wastewater per 40 CFR 122.21(h)(4)

addresses industries identified as "*Primary Industry*[25]", and **Figure 2-5** addresses "*Non-Primary Industry*". The **Industrial Facility Pollutants Tables** in **Section 2.2.5** are taken from 40 CFR 122, App. D and EPA Application form 2A, and are augmented with any state water quality criteria not reflected in these sources. The missing state water quality criteria have been inserted into the appropriate chemical group within the tables and would only require monitoring when the pollutant parameters are known to be present in the effluent.

Due to the complexity of determining the appropriate industrial monitoring requirements, the permit writer should work directly with the industrial facility to ensure that all reporting requirements are included in the facility evaluation. This might include review of hazardous material inventories (SARA Title III, RCRA or State Fire Marshal records) combined with assessment of facility processes to determine if those pollutants have the potential to enter the effluent. Another good source of information for the permit writer is the **Hazardous Substances Used, Stored, Produced of Transferred at a Facility that Indicate Probability of Toxicity Table** located in 40 CFR 302.4.

Typically, the pollutant scan monitoring will occur within the first two years of a permit term and each sample must be taken between four and eight months apart, as to be representative of seasonal variation. For a new permit application it might be necessary for the permit writer to conduct a *Qualitative RPA* when facility specific effluent monitoring data is not available. In these circumstances the permit writer should refer to guidance in the USEPA NPDES Permit Writers Manual and TSD. The permit writer should be aware of the small business and intake exemptions indicated in 40 CFR 122 (g)(8), but in almost all cases these are not applicable or do not result in a meaningful reduction of required monitoring parameters.

Federal application rules require a minimum of one analysis (grab sample or composite sample) for each pollutant parameter. To ensure a robust effluent characterization, the department requires facilities to collect a minimum of four composite samples (or grab samples for pH, temperature, cyanide, total phenols, residual chlorine, oil and grease and fecal coliform) for pollutant parameters with water quality criteria. Where it can be demonstrated that a facility has no history of pollutant discharge, the permit writer may introduce a sunset provision or reduce the monitoring requirements (min. of one analysis) in the permit, documenting the action in the permit evaluation report.

[25] Facilities with activities described in **Table I** of this IMD or Table 2c-2 of the EPA Form 2-C.

Figure 2-4
Primary Industry Monitoring Requirements Determination Process

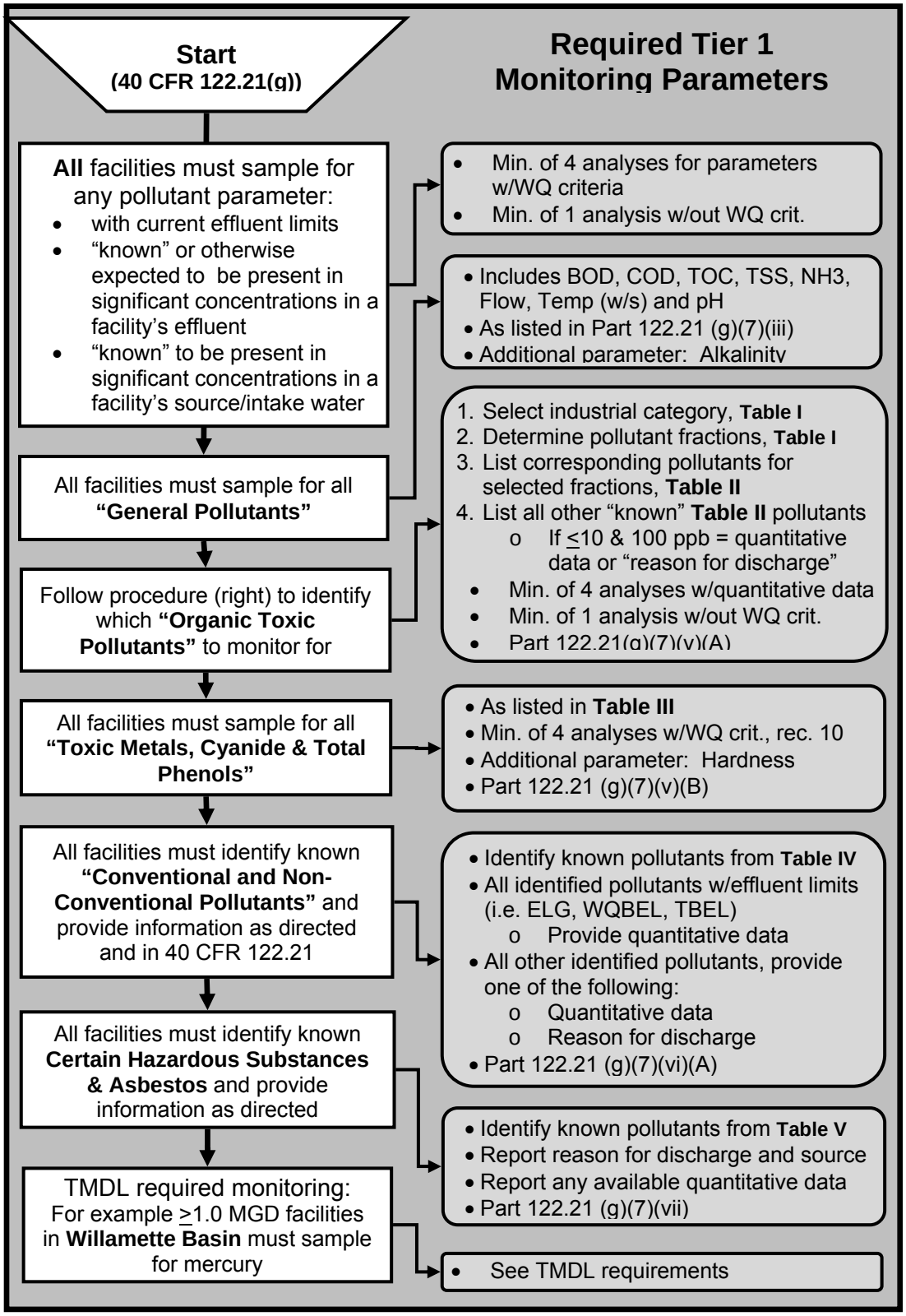
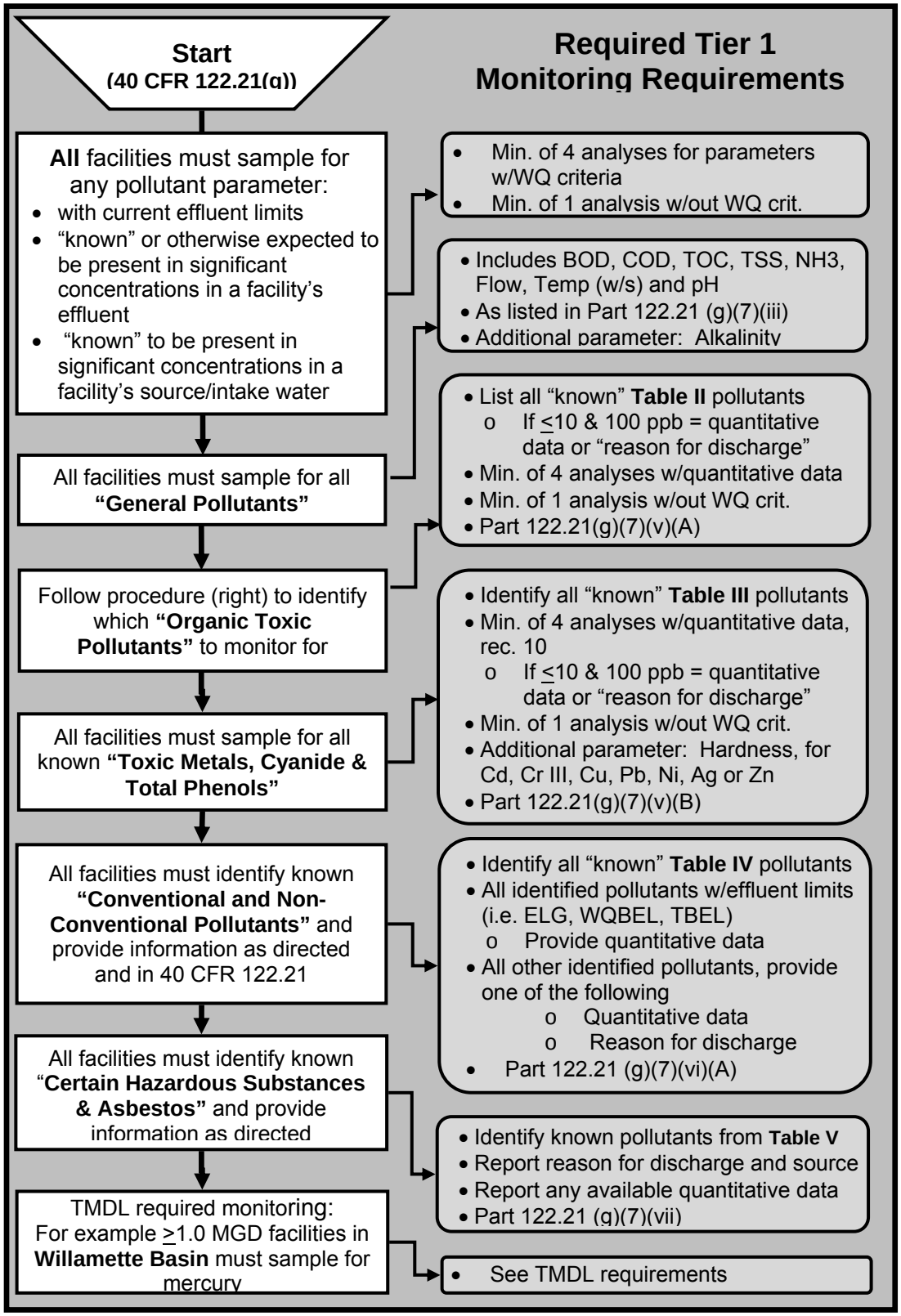


Figure 2-5
Non-Primary Industry Monitoring Requirements Determination Process



2.2.5 Industrial Facility Pollutant Tables

The tables below are taken from *Appendix D to 40 CFR, Part 122-NPDES Permit Application Testing Requirements.*

Table I—Testing Requirements for Organic Toxic Pollutants by Industry Category				
Industry category	***GC/MS fraction[1]***			
	Volatile	***Acid***	***Neutral***	***Pesticide***
Adhesives and sealants	X	X	X	
Aluminum forming	X	X	X	
Auto and other (coin operated) laundries	X	X	X	X
Battery manufacturing	X		X	
Coal mining				
Coil coating	X	X	X	
Copper forming	X	X	X	
Electric and electronic components	X	X	X	X
Electroplating	X	X	X	
Explosives manufacturing		X	X	
Foundries	X	X	X	
Gum and wood (all subparts except D and F)	X	X		
Subpart D—tall oil rosin	X	X	X	
Subpart F—rosin-based derivatives	X	X	X	
Inorganic chemicals manufacturing	X	X	X	
Iron and steel manufacturing	X	X	X	
Leather tanning and finishing	X	X	X	
Mechanical products manufacturing	X	X	X	
Nonferrous metals manufacturing	X	X	X	X
Ore mining (applies to the base and precious metals/Subpart B)		X		
Organic chemicals manufacturing	X	X	X	X
Paint and ink formulation	X	X	X	
Pesticides	X	X	X	X
Petroleum refining	X			
Pharmaceutical preparations	X	X	X	
Photographic equipment and supplies	X	X	X	
Plastic and synthetic materials manufacturing	X	X	X	X
Plastic processing	X			
Porcelain enameling				
Printing and publishing	X	X	X	X
Pulp and paperboard mills	See *Pulp and Paperboard Mills Table*			
Rubber processing	X	X	X	
Soap and detergent manufacturing	X	X	X	
Steam electric power plants	X	X		
Textile mills (Subpart C—Greige Mills are exempt from this table)	X	X	X	
Timber products processing	X	X	X	X
X = Testing required	[1]The pollutants in each fraction are listed in *Table II,*			

Pulp and Paperboard Mills Table				
40 CFR 430, Subpart*	***GS/MS fractions***			
	VOA	***Acid***	***Base/neutral***	***Pesticides***
A	2	1	2	1
B	2	1	2	2
C	2	1	2	2
D	2	1	2	2
E	1	1	2	1
F	1	1	2	2
G	1	1	2	2
H	1	1	2	2
I	1	1	2	2
J	1	1	1	2
K	1	1	2	2
L	1	1	2	2

1 = Must test
2 = Do not test unless "reason to believe" it is discharged
*Subparts are defined in 40 CFR Part 430

Table II—Organic Toxic Pollutants in Each of Four Fractions in Analysis by Gas Chromatography/Mass Spectroscopy (GS/MS)	
Volatiles	
1V acrolein	2V acrylonitrile
3V benzene	5V bromoform
6V carbon tetrachloride	7V chlorobenzene
8V chlorodibromomethane	9V chloroethane
10V 2-chloroethylvinyl ether	11V chloroform
12V dichlorobromomethane	14V 1,1-dichloroethane
15V 1,2-dichloroethane	16V 1,1-dichloroethylene
17V 1,2-dichloropropane	18V 1,3-dichloropropylene
19V ethylbenzene	20V methyl bromide
21V methyl chloride	22V methylene chloride
23V 1,1,2,2-tetrachloroethane	24V tetrachloroethylene
25V toluene	26V 1,2-trans-dichloroethylene
27V 1,1,1-trichloroethane	28V 1,1,2-trichloroethane
29V trichloroethylene	31V vinyl chloride
Acid Compounds	
1A 2-chlorophenol	2A 2,4-dichlorophenol
3A 2,4-dimethylphenol	4A 4,6-dinitro-o-cresol
5A 2,4-dinitrophenol	6A 2-nitrophenol
7A 4-nitrophenol	8A p-chloro-m-cresol
9A pentachlorophenol	10A phenol
11A 2,4,6-trichlorophenol	

Table II—Organic Toxic Pollutants (continued)	
Base/Neutral	
1B acenaphthene	2B acenaphthylene
3B anthracene	4B benzidine
5B benzo(a)anthracene	6B benzo(a)pyrene
7B 3,4-benzofluoranthene	8B benzo(ghi)perylene
9B benzo(k)fluoranthene	10B bis(2-chloroethoxy)methane
11B bis(2-chloroethyl)ether	12B bis(2-chloroisopropyl)ether
13B bis (2-ethylhexyl)phthalate	14B 4-bromophenyl phenyl ether
15B butylbenzyl phthalate	16B 2-chloronaphthalene
17B 4-chlorophenyl phenyl ether	18B chrysene
19B dibenzo(a,h)anthracene	20B 1,2-dichlorobenzene
21B 1,3-dichlorobenzene	22B 1,4-dichlorobenzene
23B 3,3′-dichlorobenzidine	24B diethyl phthalate
25B dimethyl phthalate	26B di-n-butyl phthalate
27B 2,4-dinitrotoluene	28B 2,6-dinitrotoluene
29B di-n-octyl phthalate	30B 1,2-diphenylhydrazine (azobenzene)
31B fluroranthene	32B fluorene
33B hexachlorobenzene	34B hexachlorobutadiene
35B hexachlorocyclopentadiene	36B hexachloroethane
37B indeno(1,2,3-cd)pyrene	38B isophorone
39B napthalene	40B nitrobenzene
41B N-nitrosodimethylamine	42B N-nitrosodi-n-propylamine
43B N-nitrosodiphenylamine	44B phenanthrene
45B pyrene	46B 1,2,4-trichlorobenzene
Pesticides	
1P aldrin	2P alpha-BHC
3P beta-BHC	4P gamma-BHC
5P delta-BHC	6P chlordane
7P 4,4′-DDT	8P 4,4′-DDE
9P 4,4′-DDD	10P dieldrin
11P endosulfan I (alpha)	12P endosulfan II (beta)
13P endosulfan sulfate	14P endrin
15P endrin aldehyde	16P heptachlor
17P heptachlor epoxide	18P PCB- Aroclor 1242
19P PCB- Aroclor 1254	20P PCB- Aroclor 1221
21P PCB- Aroclor 1232	22P PCB- Aroclor 1248
23P PCB- Aroclor 1260	24P PCB- Aroclor 1016
25P toxaphene	

Table III – Other Toxic Pollutants (Metals and Cyanide) and Total Phenols	
Antimony	Nickel
Arsenic	Selenium
Beryllium	Silver
Cadmium	Thallium
Chromium	Zinc
Copper	Cyanide (Free & Total)
Lead	Phenols
Mercury	Hardness (required to det. WQ criteria)

Table IV – Conventional and Nonconventional Pollutants Required To Be Tested by Existing Dischargers if Expected to be Present (in the effluent)	
Aluminum, Total	Malathion *
Arsenic (III) *	Manganese, Total
Arsenic, Inorganic *	Methoxychlor *
Barium, Total	Mirex *
BHC – Technical *	Molybdenum, Total
Boron, Total	Nitrate-Nitrite
Bromide	Nitrogen, Total Organic
Chloride	Nitrosamines
Chlorine, Total Residual	N-Nitrosodibutylamine
Chloromethly Ether, Bis *	N-Nitrosodiethylamine
Cobalt, Total	N-Nitrosopyrrolidine
Color	Oil and Grease
Chlorophenoxy Herbicide (2,4,5-TP) *	Parathion *
Chloropyrifos *	PCBs, Total *
Chromium (III) *	Pentachlorobenzene *
Chromium (VI) *	Phosphorus, Elemental * &Total
Dementon *	Radioactivity
2,4-D (2,4-Dichlorophenoxy acetic acid) *	Sulfate
Dioxin 2,3,7,8-TCDD *	Sulfide
Dinitrophenols *	Sulfide-Hydrogen Sulfide
Endosulfan *	Sulfite
Fecal Coliform	Surfactants
Fluoride	Tetrachlorobenzene,1,2,4,5 *
Guthion *	Tin, Total
Iron, Total *	Trichlorophenol, 2,4,5 *
Magnesium, Total	Titanium, Total
Please note that all parameters with a "*" are state water quality criteria not listed in 40 CFR 122 or in the EPA application forms (i.e. 2A, 2C)	

Table V - Toxic Pollutants and Hazardous Substances Required To Be Identified by Existing Dischargers if Expected To Be Present	
Toxic Pollutants	
Asbestos	
Hazardous Substances	
Acetaldehyde	Crotonaldehyde
Allyl alcohol	2,4-D (2,4-Dichlorophenoxy acetic acid)
Allyl chloride	Diazinon
Amyl acetate	Dicamba
Aniline	Dichlobenil
Benzonitrile	Dichlone
Benzyl chloride	2,2-Dichloropropionic acid
Butyl acetate	Dichlorvos
Butylamine	Diethyl amine
Captan	Dimethyl amine
Carbaryl	Dintrobenzene
Carbofuran	Diquat
Carbon disulfide	Disulfoton

Table V – Continued: *Hazardous Substances*	
Chlorpyrifos	Diuron
Coumaphos	Epichlorohydrin
Cresol	Ethion
Ethylene diamine	Phenolsulfanate
Ethylene dibromide	Phosgene
Formaldehyde	Propargite
Furfural	Propylene oxide
Guthion	Pyrethrins
Isoprene	Quinoline
Isopropanolamine Dodecylbenzenesulfonate	Resorcinol
Kelthane	Strontium
Kepone	Strychnine
Malathion	Styrene
Mercaptodimethur	2,4,5-T (2,4,5-Trichlorophenoxy acetic acid)
Methoxychlor	TDE (Tetrachlorodiphenylethane)
Methyl mercaptan	Trichlorofan
Methyl methacrylate	Triethanolamine dodecylbenzenesulfonate
Methyl parathion	Triethylamine
Mevinphos	Trimethylamine
Mexacarbate	Uranium
Monoethyl amine	Vanadium
Monomethyl amine	Vinyl acetate
Naled	Xylene
Napthenic acid	Xylenol
Nitrotoluene	Zirconium
Parathion	

2.3 Pollutant Parameters Without Numeric Water Quality Criteria

Following the preceding procedures will typically result in the selection of a number of pollutant parameters that do not have corresponding numeric water quality criteria[26]. These pollutants will be required to be included in the permit monitoring conditions.

The RPA Workbook includes these pollutant parameters so that the permit writer may use the individual spreadsheet to identify all applicable monitoring requirements. Where visible on the **Monitoring Required** spreadsheet, these parameters are typically *hidden* on the remaining spreadsheets. To *unhide* these pollutant parameters the permit writer should highlight the rows above and below the hidden row, right click the mouse and select "**Unhide**".

[26] For example, Beryllium, Kjeldahl nitrogen, total chrome, etc.

2.4 Reporting Procedures

The permit must require the permittee to submit a *Summary Report* (both electronic and paper versions) and copies of the laboratory analytic reports for all Tier 1 and subsequent Tier 2 effluent monitoring with a certification statement pursuant to 40 CFR 122.22(d). The Department will provide an electronic template to the permittee for developing the Summary Report, and the analytic report can be generated by either the analytical laboratory or the permittee as long as it meets the requirements described in this section. Typically, effluent data collected for Tier 1 or 2 monitoring will be submitted to the Department's Inspector at the regional office for compliance purposes, and a duplicate data set sent to DEQ's WQD OIS group to be entered into the Department's reporting database, Discharge Monitoring System (DMS). The Summary Report must be submitted to the Department by the permittee within 30 calendar days after receipt of the analytical report for the final round of sampling.

The permittee may use a letter with the certification statement to cover the submittal of the Summary Report and laboratory analytical reports. The letter should include:

- Facility Identification (facility legal name, DEQ File and Permit Numbers).
- Outfall identification.
- Reference to the specific analytic report.
- Signature from a responsible corporate officer (industrial), principal executive officer (domestic) or proprietor.
- The following statement:

  I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

At a minimum, the analytic report should include:

- Facility identification information and date of analysis.
- Each pollutant parameters stated with exactly the same spelling as in the permit.
- Corresponding Chemical Abstract Service number for each pollutant parameter.
- The analytic method used for each pollutant parameter.
- The Method Detection and Quantitation Limit for each pollutant parameter.
- For all toxics, the reported analytic values in the units of micrograms per liter (ug/l).
- If a sample result is at or below the detection level, report the result as less than the specified detection level. For example, if the detection level is 1.0 ug/L and the result is non-detect, report "*<1.0 ug/L*" on the analytic report. To calculate the mass load from this result, use the detection level. Report the mass load as

less than the calculated mass load. For example, if flow is 2 MGD and the reported sample result is <1.0 ug/L, report "*<0.017 lb/day*" for mass load on the analytic report (1.0 ug/L x 2 MGD x conversion factor = 0.017 lb/day).

- If a sample result is above the detection level but below the quantitation level, report the result as the detection level preceded by the Department's data code "*e*". This code identifies the result as being between the detection level and quantitation level. For example, if the detection level is 1 ug/l and the quantitation level is 5 ug/L and the sample result is 4 ug/L, report "*e1 ug/l*" on the analytic report. To calculate the mass load from this result, use the detection level. Report the mass load as less than the calculated mass load preceded by "*e*". For example, if flow is 2 MGD and the reported sample result is e1.0 ug/L, report "e0.017 lb/day" for mass load on the analytic report (1.0 ug/L x 2 MGD x conversion factor = 0.017 lb/day).
- Quality Assurance/Quality Control information.

The permittee is already required to maintain the sampling and analysis records including chain of custody and quality assurance/quality control information and make monitoring records available for inspection.

2.5 Schedule B: Suggested Monitoring Requirement Language

The department has developed suggested **Schedule B** permit language that includes recommended monitoring frequencies for most pollutant parameters. Various versions of this language applicable to different types of industrial and domestic facilities are located on the Permit Writers' Corner of QNET under the "Permit Template" heading.

Section 3: Identify Pollutants of Concern

3.1 Process Overview

The next step of the RPA process (**Step 3**) is use the Tier 1 monitoring data to identify POCs in the effluent. The POCs are identified by statistically evaluating the data collected in the Tier 1 monitoring scan. The permit writer uses the **Aquatic** and **Human Health RPA** spreadsheets to project[27] a maximum potential effluent concentration value (at the "end of pipe"). The calculated maximum concentration is then compared to the State Water Quality Criterion[28]. Any pollutant exceeding the water quality criterion is identified as a POC and will require additional analysis in the **Steps 4** and **5**, where the receiving water body is characterized and (optionally) additional effluent or collection system data is collected to determine in-stream reasonable potential. No further action is required for the remaining pollutant parameters, although they would be included in the monitoring requirements for the next permit cycle. Please refer to **Figure 3-1** for an example of this step.

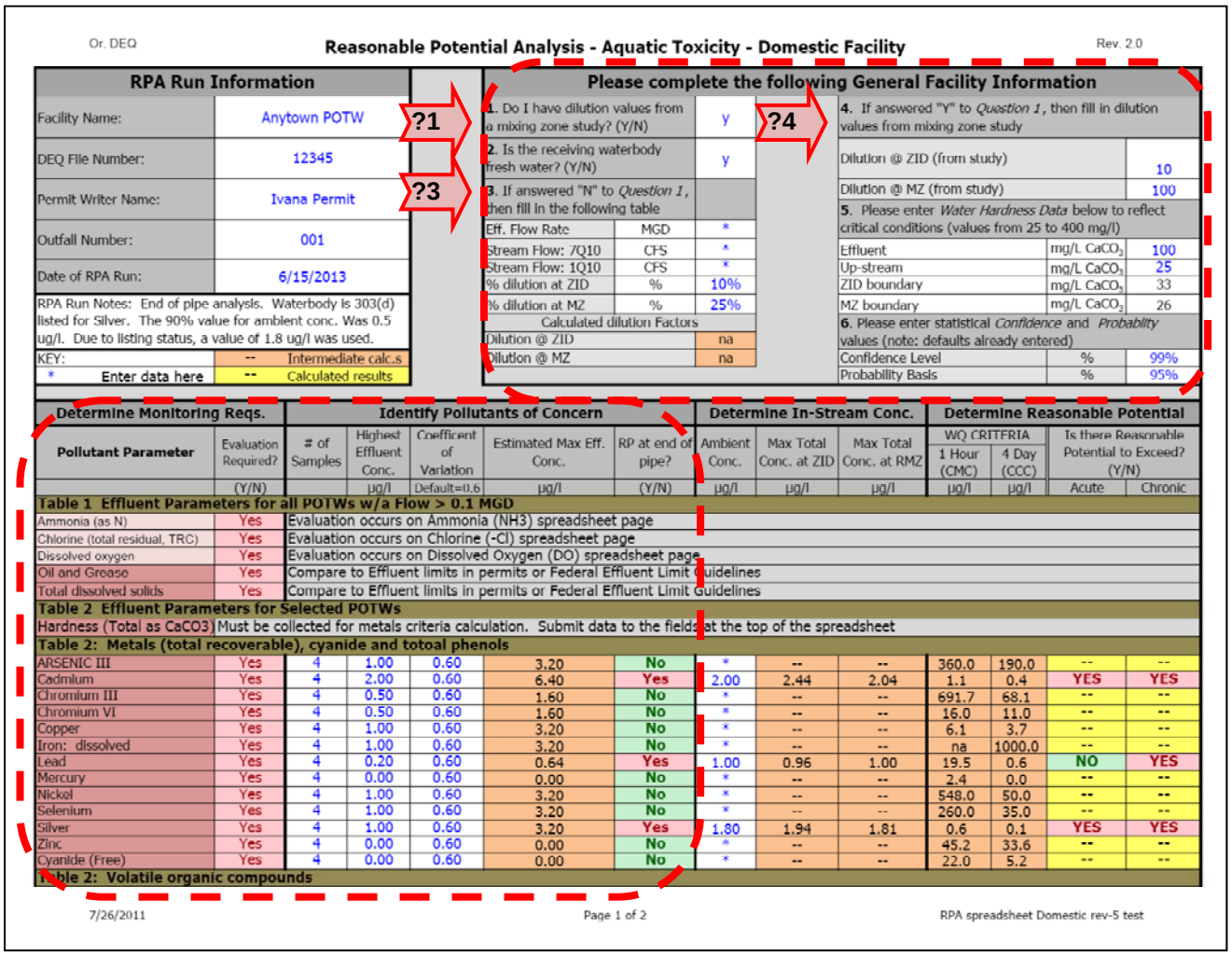
3.2 Entering General Facility Information

To begin using the **RPA Workbook**, enter the facility's effluent flow and hardness data into the *General Facility Information* box at the top of the **Aquatic RPA** spreadsheet. Based upon the answer to **Question 1** in the box, the spreadsheet is designed to either use a "dilution value" taken from a mixing zone analysis (in **Question 4**), or calculate a dilution value using general effluent and stream flow information (in **Question** 3). Please refer to the areas indicated by arrows on **Figure 3-1**.

When calculating a dilution value in **Question 3**, refer to the guidance[29] in the RMZ IMD Part 2 when determining the appropriate effluent values to enter into the "*Eff. Flow Rate*" portion of the information box. Although not necessary for this step, it is recommended that the balance of the ambient stream flow and dilution information (if available) also be entered at this time.

[27] The spreadsheets project a normal distribution curve about the available data points and the maximum projected value reflect a 95th or 99th percentile.
[28] OAR 340-041-0033(2) *Levels of toxic substances in waters of the state may not exceed the applicable (Aquatic Toxicity) criteria listed in Tables 20, 33A, and 33B.* Additionally, concentrations may not exceed the currently effective Human Health Water Quality Criteria.
[29] **Section 4.4, Discharge Characteristics**, p. 30.

Figure 3-1
Example of the RPA Workbook



Or. DEQ — **Reasonable Potential Analysis - Aquatic Toxicity - Domestic Facility** — Rev. 2.0

RPA Run Information

Facility Name:	Anytown POTW
DEQ File Number:	12345
Permit Writer Name:	Ivana Permit
Outfall Number:	001
Date of RPA Run:	6/15/2013

RPA Run Notes: End of pipe analysis. Waterbody is 303(d) listed for Silver. The 90% value for ambient conc. Was 0.5 ug/l. Due to listing status, a value of 1.8 ug/l was used.

KEY: -- Intermediate calc.s; * Enter data here; -- Calculated results

?1 ?3

Please complete the following General Facility Information

1. Do I have dilution values from a mixing zone study? (Y/N)		y
2. Is the receiving waterbody fresh water? (Y/N)		y
3. If answered "N" to *Question 1*, then fill in the following table		
Eff. Flow Rate	MGD	*
Stream Flow: 7Q10	CFS	*
Stream Flow: 1Q10	CFS	*
% dilution at ZID	%	10%
% dilution at MZ	%	25%
Calculated dilution Factors		
Dilution @ ZID		na
Dilution @ MZ		na

?4

4. If answered "Y" to *Question 1*, then fill in dilution values from mixing zone study		
Dilution @ ZID (from study)		10
Dilution @ MZ (from study)		100
5. Please enter *Water Hardness Data* below to reflect critical conditions (values from 25 to 400 mg/l)		
Effluent	mg/L $CaCO_3$	100
Up-stream	mg/L $CaCO_3$	25
ZID boundary	mg/L $CaCO_3$	33
MZ boundary	mg/L $CaCO_3$	26
6. Please enter statistical *Confidence* and *Probability* values (note: defaults already entered)		
Confidence Level	%	99%
Probability Basis	%	95%

Determine Monitoring Reqs.		Identify Pollutants of Concern					Determine In-Stream Conc.			Determine Reasonable Potential			
Pollutant Parameter	Evaluation Required?	# of Samples	Highest Effluent Conc.	Coefficent of Variation	Estimated Max Eff. Conc.	RP at end of pipe?	Ambient Conc.	Max Total Conc. at ZID	Max Total Conc. at RMZ	WQ CRITERIA 1 Hour (CMC)	WQ CRITERIA 4 Day (CCC)	Is there Reasonable Potential to Exceed? (Y/N) Acute	Is there Reasonable Potential to Exceed? (Y/N) Chronic
	(Y/N)		µg/l	Default=0.6	µg/l	(Y/N)	µg/l	µg/l	µg/l	µg/l	µg/l		
Table 1 Effluent Parameters for all POTWs w/a Flow > 0.1 MGD													
Ammonia (as N)	Yes	Evaluation occurs on Ammonia (NH3) spreadsheet page											
Chlorine (total residual, TRC)	Yes	Evaluation occurs on Chlorine (-Cl) spreadsheet page											
Dissolved oxygen	Yes	Evaluation occurs on Dissolved Oxygen (DO) spreadsheet page											
Oil and Grease	Yes	Compare to Effluent limits in permits or Federal Effluent Limit Guidelines											
Total dissolved solids	Yes	Compare to Effluent limits in permits or Federal Effluent Limit Guidelines											
Table 2 Effluent Parameters for Selected POTWs													
Hardness (Total as CaCO3)	Must be collected for metals criteria calculation. Submit data to the fields at the top of the spreadsheet												
Table 2: Metals (total recoverable), cyanide and totoal phenols													
ARSENIC III	Yes	4	1.00	0.60	3.20	No	*	--	--	360.0	190.0	--	--
Cadmium	Yes	4	2.00	0.60	6.40	Yes	2.00	2.44	2.04	1.1	0.4	YES	YES
Chromium III	Yes	4	0.50	0.60	1.60	No	*	--	--	691.7	68.1	--	--
Chromium VI	Yes	4	0.50	0.60	1.60	No	*	--	--	16.0	11.0	--	--
Copper	Yes	4	1.00	0.60	3.20	No	*	--	--	6.1	3.7	--	--
Iron: dissolved	Yes	4	1.00	0.60	3.20	No	*	--	--	na	1000.0	--	--
Lead	Yes	4	0.20	0.60	0.64	Yes	1.00	0.96	1.00	19.5	0.6	NO	YES
Mercury	Yes	4	0.00	0.60	0.00	No	*	--	--	2.4	0.0	--	--
Nickel	Yes	4	1.00	0.60	3.20	No	*	--	--	548.0	50.0	--	--
Selenium	Yes	4	1.00	0.60	3.20	No	*	--	--	260.0	35.0	--	--
Silver	Yes	4	1.00	0.60	3.20	Yes	1.80	1.94	1.81	0.6	0.1	YES	YES
Zinc	Yes	4	0.00	0.60	0.00	No	*	--	--	45.2	33.6	--	--
Cyanide (Free)	Yes	4	0.00	0.60	0.00	No	*	--	--	22.0	5.2	--	--
Table 2: Volatile organic compounds													

7/26/2011 — Page 1 of 2 — RPA spreadsheet Domestic rev-5 test

Figure 3-1 Explanation
Identify Pollutants of Concern

6 The PW enters the *effluent flow rate* and *hardness values* into the "**General Facility Information**" portion of the spreadsheet.

7 The PW enters the "**# of samples**" collected, "**Highest Effluent Conc.**" (or "**Effluent Conc.**") and "**Coefficient of Variation**" into the spreadsheet.

8 The spreadsheet will calculate and report a "***Calculated Max. Eff. Conc.***" and compare it to the water quality criterion.

9 If the calculated concentration exceeds the water quality criterion, then a "Yes" is reported in the "**RP WQ at End of Pipe?**" column.

10 If the calculated concentration does not exceed the water quality criterion, then a "*No*" is reported in the "**RP at End of Pipe?**" column.

11 The PW should check to ensure that there is a reported value for every pollutant parameter that is indicated as requiring evaluation or where monitoring data ("*# of Samples*" or "*Highest Conc.*") has been entered.

3.3 Analysis of Identified Parameters

For each pollutant parameter with a "Yes" in the "***Evaluation Required?***" column, the permit writer will perform a preliminary analysis and fill in effluent monitoring data for the applicable parameter located under the heading "**Identify Pollutants of Concern**" in the workbook. The permit writer enters the number of samples taken during the monitoring period into the **"# of Samples**" column[30]. For the aquatic toxicity and non-carcinogen human health evaluations, the permit writer then enters the value (in ug/l) of the highest reported concentration during the monitoring period into the "**Effluent Conc.**" column. For the carcinogenic human health evaluations, the permit writer then enters the value of the geometric mean[31] of the data into the "**Effluent Conc.**" column. In cases where all analytic results are "non-detect", the permit writer should enter an "**nd**" into the "**Effluent Conc**." column. Values should be entered into the spreadsheets according to the department's significant figures guidance (Significant Figures IMD).

Finally, the permit writer enters a Coefficient of Variance (CV) into the Column entitled "**Coefficient of Variance**". If the number of samples of the data set is less than "10," the permit writer should enter a default of "0.6". If the number of samples is greater than or equal to "10," the permit writer should calculate the CV using the following method.

Example: How to calculate a CV from a data set

Given: I have the following values from the analytical reports

1.0, 1.0, 1.0, 2.0, 1.0, 3.0, 2.0, 1.0, 3.0, 4.0, 5.0, 1.0 ug/l

Answer: There are **12** data points, with a mean (or average) value of **2.1**

$$(1.0+1.0+1.0+2.0+1.0+3.0+2.0+1.0+3.0+4.0+5.0+1.0) / 12 = 2.1$$

To calculate the standard deviation, we compute the difference of each data point from the mean, and square the result:

$(1.0-2.1)^2 = 1.2$	$(1.0-2.1)^2 = 1.2$	$(3.0-2.1)^2 = 0.8$
$(1.0-2.1)^2 = 1.2$	$(3.0-2.1)^2 = 0.8$	$(4.0-2.1)^2 = 3.6$
$(1.0-2.1)^2 = 1.2$	$(2.0-2.1)^2 = 0.0$	$(5.0-2.1)^2 = 8.4$
$(2.0-2.1)^2 = 0.0$	$(1.0-2.1)^2 = 1.2$	$(1.0-2.1)^2 = 1.2$

Next we divide the sum of these values by the "degrees of freedom" (n-1), and take the square root, which gives the standard deviation:

$$[(1.2+1.2+1.2+0.0+1.2+0.8+0.0+1.2+0.8+3.6+8.4+1.2) / (12-1)]^{1/2} = 1.4$$

Therefore, the standard deviation is **1.4**. Finally we divide the standard deviation by the mean, and round to arrive at a coefficient of variation of **0.7**.

$$CV = 1.3 / 2.1 = 0.6666\ldots \text{ rounds to } 0.7$$

Note: When using a spreadsheet, there might be computational differences in the results when compared to rounding each calculation step.

[30] In addition to copies of the analytic reports, the permittee will submit a Summary Report of the analytic results using an electronic template. This will help to simplify the data entry process.

[31] In the case of geomeans, values of "0" cannot be used. It is recommended that the permit writer use their professional judgment and either use a geometric mean where "ND = ½ of DL", or take the mean of the values and multiply by a safety factor of 0.9. (ref. Nehls & Akland, 1973)

3.4 Interpretation of Results

The workbook will auto-calculate a statistical maximum effluent concentration and compare the result to each water quality criterion[32]. This is reported in the column entitled "**Estimated Max. Eff. Conc.**" If the estimated effluent concentration is equal to or exceeds the criteria, then a "*Yes*" will be entered into the column entitled "**RP at end of Pipe?**". Pollutant parameters that exceed the criteria at the end of pipe will require ambient water characterization and further analysis in **Step 3** of the RPA. This is illustrated in **Figure 3-2**.

Pollutant parameters with a "*No*" entered into the "*Exceed WQ"* column do not exceed the water quality criteria at the end of pipe and do not require additional reasonable potential analysis. In instances where Tier 1 analytic results are "non-detect", additional analyses are not typically required although the permit writer should review the analytic limits and consider additionally monitoring during the Tier 2 monitoring. The permit writer should document the evaluation of both the affirmative and negative results by placing a copy of the applicable workbook pages into the PER with a brief discussion.

3.5 Additional Information: Narrative Criteria and Whole Effluent Testing

It should be noted that a permittee will typically be required by 40 CFR 136 and EPA application forms to monitor for more pollutants than there are State Water Quality Criteria. Based on this data, a permit writer might use their discretion to require WET analysis (if it is not already required). The data might also be used as part of a Toxic Identification Reduction Evaluation (TIRE) that is mandated when an "affirmative" WET finding is made. Finally, the data might be used in the investigation of a beneficial use impairment not addressed through the RPA nor WET analysis.

When required[33], the WET analysis is conducted after the RPA and identifies instances of aquatic toxicity (not identified in the RPA) or synergistic effects. Whereas the RPA is designed to protect water quality using the State Water Quality Criteria, the WET analysis is the primary mechanism to protect water quality using the state's Narrative Toxic Criteria[34]. In instances where there is evidence of beneficial use impairment, the

[32] In the instance of a RPA for Aquatic Toxicity, the maximum effluent concentration will be compared to water criterion for both the *criterion continuous concentration* (CCC) (chronic) and the *criterion maximum concentration* (CMC)(acute) and indicate a "Yes" if either are exceeded. In the instance of a RPA for Human Health, the maximum effluent concentration will be compared to the water criterion for both the *Water + Fish Consumption* and *Fish Consumption* criterion.

[33] For example, facilities with a design flow greater than 1 MGD are required to conduct WET testing. When possible, WET sampling should occur in conjunction with priority pollutant sampling.

[34] OAR 340-041-0033(1) *Toxic substances may not be introduced above natural background levels in waters of the state in amounts, concentrations, or combinations that may be harmful, may chemically change to harmful forms in the environment, or may accumulate in sediments or*

permit writer may use best professional judgment and the guidance values listed in **Table 33C** to apply the Narrative Toxic Criteria. For additional information regarding WET, please contact the WET coordinator (located at the DEQ Lab) or Surface Water Management Technical Staff.

Figure 3-2
Example of Result Interpretation

Determine Monitoring Reqs.		Identify Pollutants of Concern				
PARAMETER	Evaluation Required?	# of Samples	Highest Effluent Conc.	Coefficent of Varience	Estimated Max Eff. Conc.	RP at end of pipe?
	(Y/N)		µg/l	Default=0.6	µg/l	(Y/N)
Table 1 Effluent Parameters for all POTWs w/a Flow > 0.1 MGD						
Ammonia (as N)	Yes	Evaluation occurs on Ammonia (NH3) spreadsheet page				
Chlorine (total residual, TRC)	Yes	Evaluation occurs on Chlorine (-Cl) spreadsheet page				
Dissolved oxygen	Yes	Evaluation occurs on Dissolved Oxygen (DO) spreadsheet page				
Oil and Grease	Yes	Compare to Effluent limits in permits or Federal Effluent Limit Guid				
Total dissolved solids	Yes	Compare to Effluent limits in permits or Federal Effluent Limit Guid				
Table 2 Effluent Parameters for Selected POTWs						
Hardness (Total as CaCO3)	Must be collected for metals criteria calculation. Submit data to the fields at t					
Table 2: Metals (total recoverable), cyanide and totoal phenols						
ARSENIC III (State Only)	Yes	4	1.00	0.60	3.20	No
Cadmium	Yes	4	2.00	0.60	6.40	Yes
Chromium III + (State Only)	Yes	4	0.50	0.60	1.60	No
Chromium VI (State Only)	Yes	4	0.50	0.60	1.60	No
Copper	Yes	4	1.00	0.60	3.20	No
Iron: dissolved (State Only)	Yes	4	1.00	0.60	3.20	No
Lead	Yes	4	0.20	0.60	0.64	Yes
Mercury	Yes	4	0.00	0.60	0.00	No
Nickel	Yes	4	1.00	0.60	3.20	No
Selenium	Yes	4	1.00	0.60	3.20	No
Silver	Yes	4	1.00	0.60	3.20	Yes
Zinc	Yes	4	0.50	0.60	1.60	No
Cyanide (Free)	Yes	4	1.00	0.60	3.20	No
Table 2: Volatile organic compounds						
Table 2: Acid-extractable compounds						
pentachlorophenol	Yes	4	nd	0.60	--	Non Dect.

3.6 Next Step

After the permit writer has completed the identification of the POCs, the permit writer will report the results, (Tier 2) monitoring requirements and recommendations to the permittee (**Step 4**). The permittee must then develop and implement a sampling plan to collect the necessary data during the following year. This is presented in **Section 4** of the IMD.

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Section 4: Tier 2 Monitoring

4.1. Tier 2 Monitoring Overview

By the end of the second year (month 24) of the permit term, the permit writer should have identified the pollutant parameters subject to evaluation and then performed an end-of-pipe reasonable potential screening to identify the POCs (**Step 3**). In **Step 4**, the permittee conducts Tier 2 monitoring to collect/submit the ambient water quality data and any additional effluent data for each identified POC that will enable the permit writer to model the impacts upon the receiving waters and complete the RPA in **Step 5**.

Depending upon the potential source[35] of the pollutant, a *Source Investigation* (SI) should be considered to support a later request for compliance alternatives such as an intake credit[36], site specific background criterion and/or a compliance schedule or variance. The nature and scope of the SI should be a reflection of environmental issues and the type of compliance alternative being considered. (The role of the source investigation as it relates to these compliance tools is outlined in **Section 4.3.3** and relevant IMDs.)

Additionally, Tier 2 monitoring will be used to address cases where new water quality criteria have been recently promulgated or the receiving water body has recently been listed as "water quality limited." This affords two opportunities (Tier 1 and 2) during a permit term to introduce new criterion or address recently listed water bodies into the permit development process.

Finally, Tier 2 monitoring may be used to require the collection of "dissolved" or "fraction" pollutant concentration information for those cases where Tier 1 screening indicated significant concentrations of the "total" counterparts of the same pollutant parameters[37]. This is intended to allow use of low cost screening methods to identify the need for higher cost methods for select pollutant parameters.

After evaluation of the Tier 1 data and identification of the POCs, the permit writer will issue a Monitoring Action Letter (MAL) reporting the POCs and requiring the permittee to develop a Sampling Plan and collect the data necessary to complete the RPA or support a compliance alternative (see **Section 4.2**). In cases where this data is already available or is not necessary[38], the permit writer may decide to continue with the analysis without additional monitoring requirements. The permittee must submit the completed Sampling Plan to the permit writer for review, and upon approval, begin implementation in a timely manner. The permit writer should ensure that Sampling Plan meets the permit

[35] For example: Intake water, I&I, ground water etc.
[36] Please refer to Appendix F for additional information on the use of Intake Credits
[37] For example, cyanide, arsenic, chrome III and VI.
[38] For example: Discharges to 303d listed waters where mixing zones are not permitted. Where data will be collected as part of a collaborative effort with other permittees. Where existing data is already available and is adequate for characterization.

requirements and adequately characterizes the facility's effluent and the receiving water body.

The timeline of the Tier 1 and 2 monitoring is designed to identify potential environmental issues early in the permit development process so that treatment, reduction or compliance alternatives can be explored, developed and approved by the end of the permit term. If the required or recommended Tier 2 monitoring data is not collected, then the Department may not have sufficient data to approve the use of the compliance alternatives.

The permittee will report all effluent data using the procedures described in **Section 2.4** of this document. For all other Tier 2 data (ambient, intake concentrations, etc.), the permittee will submit copies of the laboratory analytic reports with a certification statement to the Department's Inspector at the regional office as described in **Section 2.4**.

4.2. Monitoring Action Letter

To initiate the Tier 2 monitoring, the permit writer will issue a MAL to the permittee reporting the results of the "end of pipe analysis" and identified POCs, and the requirement for the permittee to develop a Sampling Plan that addresses the flowing requirements and recommendations:

Requirements

- ambient characterization of the receiving water body for each identified POC
    - For aquatic toxicity pollutant evaluations, data containing a minimum of 4, 24-hour composite samples taken during the critical low flow period (i.e. dry period) must be provided.
    - For human health pollutant evaluations, data containing a minimum of 4, 24-hour composite samples taken to characterize the annual average condition must be provided. [39]
- if necessary, effluent and ambient characterization for pollutant fractions identified by screening analysis for total pollutants[40]
- if necessary, effluent and ambient characterization for any recently[41] promulgated water quality criteria that are applicable to the permittee
- if necessary, effluent and ambient characterization for any pollutant parameter for which the receiving water body has been recently listed as "Category 5, Water Quality Limited" on the 303 d list
- all required monitoring and/or data submittal must be completed by the end of permit year three (month 36)[42]

[39] Two samples should be taken in the wet season (Feb.) and two in the dry season (Sept.).
[40] i.e. Inorganic As and As III, for total As
[41] Since the issuance of the permit.
[42] This date may be extended up to month 48, as long as there is available time to investigate and pursue environmental compliance options prior to the permit expiration date.

- the permittee must submit a data summary report and copies of all analytical laboratory reports to the permit writer by a specified date (~month 36-37).

Recommendations

- if necessary, additional effluent characterization for identified POCs
- if necessary, a Source Investigation to identify pollutant sources and quantify mass loading in preparation for the use of an intake credit or site specific background pollutant criterion

The permit writer will typically develop the MAL in consultation with the permittee to identify characterization or investigation recommendations that address any site-specific considerations. Template language for the MAL and Schedule B permit language is posted on the Permit Writer's Corner on the QNET.

4.3. Sampling Plan

The main purpose of the Sampling Plan is to allow the permittee to efficiently consolidate the various monitoring requirements (see **Section 4.3.1** and **4.3.2**) into a site-specific monitoring plan. The secondary purpose is to integrate, when necessary, the elements of a source investigation (see **Section 4.3.3**) into the characterization process so as to make both efforts more robust and cost efficient. As described in the MAL, the permittee develops the plan in consultation with the permit writer.

The requirement to develop a Sampling Plan, and to provide ambient data for POCs and effluent and ambient data for pollutant fractions is per a narrative statement in the **Schedule B** permit language and stems from the authority under 40 CFR 122.41(3)(h) ("*duty to provide information*"); 40 CFR 122.21, ("*application requirements*"); and state monitoring requirements per OAR 340-045-0015(5)(c) and (d). The permit writer also has the legal authorities for changing the frequency of the Tier 1 monitoring or reporting requirements per minor modification under 40 CFR 122.63 and OAR 340-045-0055(2)(a)(B). Therefore, the permit writer should treat a permittee's failure to submit a Sampling Plan or provide data per the approved plan, as a permit violation. Additionally, the failure to provide the required monitoring data may result in a more stringent RPA analysis and a limitation of available compliance options to address identified environmental issues. The permit writer will review the plan and provide written comments or approve within a timely manner. The permit writer should include the approved Sampling Plan and Departmental approval letter in the file.

The sampling dates in the plan should ensure the completion of the required monitoring described in the plan by the end of year three (month 36)[43]. Accordingly, the plan must be developed, approved and the monitoring completed within one year after the POCs are identified. In cases where additional data is not required or already available to complete the RPA, a Sampling Plan and additional monitoring are not necessary. In these cases,

[43] This date may be extended up to month 48, as long as there is available time to investigate and pursue environmental compliance options prior to the permit expiration date.

the permit writer must document in the PER that all data necessary to complete the RPA has been collected and a Sampling Plan is unnecessary.

4.3.1. Characterization of Receiving Water Body

The permit writer should first determine if it is necessary to characterize the receiving water body for each POC. For waters that are listed as "water quality limited" (Cat 5) on the 303(d) list, the use of mixing zones and dilution values are generally not permitted for the listed pollutant parameters. Please refer to **Section 5.5** and the **RMZ IMD** for additional information. If the water body is listed as having a completed TMDL (Cat 3), the TMDL will assign waste load allocations. Check the TMDL webpage for more information at http://www.deq.state.or.us/WQ/TMDLs/basinlist.htm. In these instances, the collection of ambient characterization data for the specific pollutant parameters is generally not required[44]. The permit writer should note any pollutant parameters for which ambient characterization is not necessary in the PER.

For receiving water bodies not on the 303(d) list, it is necessary to characterize the ambient conditions for each POC during the permitted discharge periods (i.e., year round, summer-only). This data is used in conjunction with the effluent characterization data to conduct the RPA. The ideal is to use a robust historic dataset[45] (see below) to characterize the water body, but when existing data is unavailable additional monitoring will be required. Per the monitoring requirements in the MAL, a minimum of 4 data points per flow period would be required. In cases where there are multiple POCs in different flow periods (i.e. aquatic toxicity and human health), the monitoring could be consolidated to a total of 6 samples with 4 in the critical period and 2 in the non-critical period.

Upon permit writer approval, the permittee may submit alternative ambient monitoring data in lieu of conducting sampling, as long as the submitted data is geographically relevant and current, and possesses appropriate analytical limits. Alternative data might include ambient data from U.S. EPA's STORET database, DEQ's LASAR database, Washington Dept. of Ecology database or any other source of numeric or narrative data for the POC for the receiving water in the vicinity of the point of discharge. If there are several applicants discharging to the same reach of a receiving water body, chemical monitoring data may be derived from other applicants' studies, or may be generated in a group monitoring study performed by multiple applicants discharging in the same receiving water environment. Please refer to **Table 4-1** for data sources and internet links. The permit writer should describe the basis of alternative methodologies in the PER.

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[44] The Permit Writer might consider requiring ambient monitoring data if they believe that the particular river segment is not exceeding water quality criteria. In these cases, the data could be submitted to the LASAR data base and included in the next triennial state water quality assessment. This might allow for further segmentation of the water body, and the potential that a mixing zone might be permitted in the future if assimilative capacity is available.

[45] For example, if a TMDL has been issued or updated, or DEQ has conducted a watershed assessment since the last permit renewal, there may be more current data available.

Table 4-1
Water Quality and Stream Flow Databases

Data Source	Data Type	Internet Link
OR. DEQ	Misc. WQ Data	http://deq12.deq.state.or.us/lasar2/
OR DEQ	303d List / TMDL List	http://www.deq.state.or.us/wq/assessment/assessment.htm
NOAA, NW River Forecast Center	Stream Flow Data, Forecasting	http://www.nwrfc.noaa.gov/index.shtml
USACE, Columbia Basin	Temp., TDG and Flow data	http://www.nwd-wc.usace.army.mil/TMT/wqwebpage/mainpage.htm
USEPA, STORET	Misc. WQ Data	http://www.epa.gov/storet/index.html
USGS	Misc. WQ Data	http://waterdata.usgs.gov/nwis
WA. DOE	Misc WQ Data	http://www.ecy.wa.gov/databases/wq.html

For new permit applications, it might be necessary for the permit writer to use representative data to conduct the RPA. This can include projected ambient data using a representative sample location, data from other, similar water bodies, partial monitoring data sets, etc. If the permit writer can't make a reasonable projection, it might be necessary to proceed with the permit using an expedited monitoring plan and re-opener clause, or a final effluent limit paired with a compliance schedule.

4.3.2. Additional Effluent Characterization

The permit writer should conduct the RPA based upon a robust data set with a minimum of **ten** sample points (**4** (Tier 1) + **6** (Tier 2) = **10**). This will allow better characterization of the effluent and the ability to calculate a facility-specific *coefficient of variation*, resulting in a more representative RPA. Since the Tier 1 monitoring only requires a minimum of **four** samples per pollutant, additional monitoring will be required to provide a robust data set for the universe of RPAs identified by Tier 1 monitoring.

Depending upon the results from the Tier 1 monitoring, the permit writer may send a permit action letter (as described in **Section 4.2**) requiring the permittee to collect additional effluent monitoring data (a minimum of **6** data points) for each POC. The permit writer might also require additional effluent sampling for any pollutant if there were issues meeting the Quantitation Limits, concerns regarding "false positives," or any other implementation issue encountered during the Tier 1 monitoring. If it is determined

that the Tier 1 monitoring was adequately robust[46] to conduct the RPA, the permit writer might allow additional effluent monitoring to be omitted from the sample plan.

4.3.3. Source Investigation

Depending upon knowledge of the permittee's facility and the identified POCs, the permit writer may recommend the permittee to conduct a source investigation of the POC to identify the pollutant's source, quantify the mass transported and determine the ultimate fate. This information would be used to support a request for compliance alternatives such as intake credits, variance, site specific water quality criteria, etc. Without this source investigation data being collected in a timely manner, the permit writer will have limited options for calculating WQBELs into the next permit renewal that the permittee can comply with.

A *Source Investigation* should, at minimum, identify the source (or sources) and quantify the mass loading rates for the pollutant of concern. The scope of the source investigation should depend upon the type and magnitude of the potential environmental impact. The permittee and permit writer should review the requirements for the use of an intake credit described in **Appendix F** or for the calculation of a Site Specific Background Pollutant Criterion (described in future IMD). The source investigation can be developed in an iterative manner that relies upon periodic findings and milestones to determine the need for additional monitoring.

The permit writer should encourage permittees to identify and use any existing ambient or intake monitoring databases as part of the source investigation. Examples include municipal pretreatment program information and the Department of Health Services (DHS) drinking water monitoring databases.

4.4. Next Steps

By the end of year three, the permit writer will use the results from the Tier 1 & 2 Monitoring in calculating the RPA in the **Step 5** and, if applicable, determining effluent limits in **Step 6**. At the end of year five, the RPA and WQBELs (if applicable) will be finalized for incorporation into the renewed permit**.**

[46] ie. More than one sample detected above the Detection Limit

Section 5: Reasonable Potential Analysis

5.1 Reasonable Potential Analysis Overview

Once the Sampling Plan (Tier 2 monitoring) has been implemented and the appropriate effluent and ambient characterization data for each identified POC have been collected in **Step 4**, the permit writer should be ready to enter the information into the **RPA Workbook** and conduct the *initial* RPA in **Step 5**. At the end of the permit term and as part of the permit renewal, the permit writer will conduct a *final* RPA using any additional characterization data.

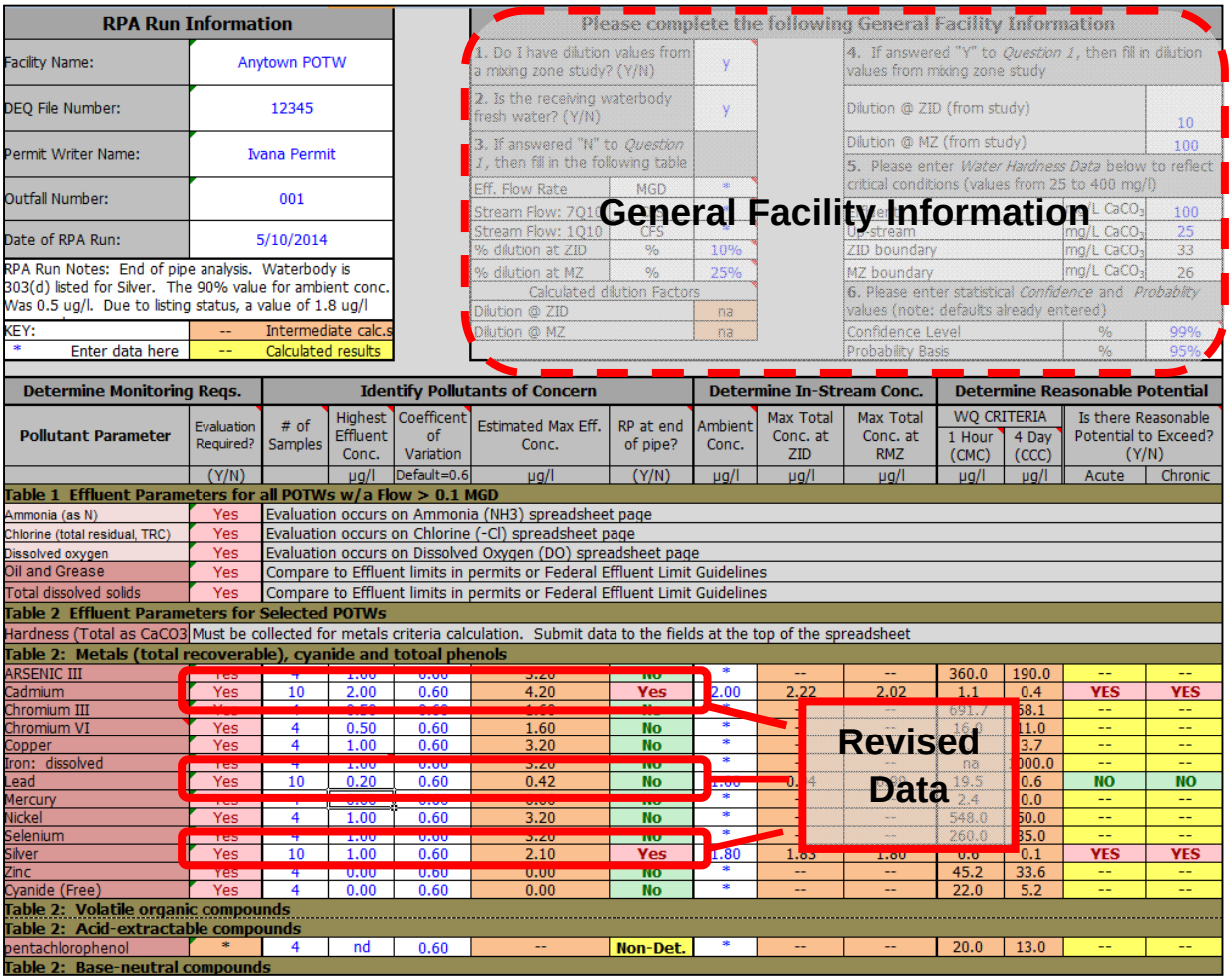
To conduct the initial RPA, the permit writer will use the partially completed **RPA Workbook** that was last used to identify POCs in **Step 3**. The permit writer would then use the Summary Report of analytic results or retrieve collected effluent and ambient characterization data from the Department's DMS[47] or LASAR databases to complete the **RPA Workbook.** The permit writer will then enter any additional *General Facility Information*, revised effluent characterization values[48] and calculated *Coefficients of Variation* (if applicable). Finally, they will then enter the *Ambient Concentration* values and the RPA workbook will process the calculations and report the RP status. This is illustrated in **Figure 5-1**.

The permit writer should proof check all data entries and ensure that the **RPA Workbook** made all required calculations. The RPA spreadsheet pages are linked to the corresponding **Aquatic Toxicity** and **Human Health Limit** spreadsheet pages and data will automatically be transferred to the limit calculation page of the workbook in **Step 6**. A summary of the values used in the various RPA calculations is described in **Table 5-1** and each is discussed through the rest of this section. In the event that a facility has a non-typical discharge[49], the permit writer should consult the discharge characterization guidance described in **Section 4.4** of the RMZ IMD Part 2.

Where adequate data is available and the minimum conditions have been met, the permit writer may consider conducting an intake credit analysis. This may change the outcome of the RPA or adjust any calculated WQBELs to reflect intake pollutant concentrations. Guidance is available in **Appendix F** and an analysis module is included on the **Aquatic Toxicity** and **Human Health RPA** spreadsheet pages of the **RPA Workbook**.

[47] DMS and tutorial information are available on the Qnet: http://deqapp1/dms/default.aspx.
[48] Ie. Number of samples, highest/mean concentration, and coefficient of variance.
[49] i.e. Wet Season only discharge, marine/estuarine discharges or facilities operating between 85% and 100% of capacity.

Figure 5-1
Example of the RPA Workbook



RPA Run Information	
Facility Name:	Anytown POTW
DEQ File Number:	12345
Permit Writer Name:	Ivana Permit
Outfall Number:	001
Date of RPA Run:	5/10/2014
RPA Run Notes: End of pipe analysis. Waterbody is 303(d) listed for Silver. The 90% value for ambient conc. Was 0.5 ug/l. Due to listing status, a value of 1.8 ug/l	
KEY:	-- Intermediate calc.s
* Enter data here	-- Calculated results

Please complete the following General Facility Information					
1. Do I have dilution values from a mixing zone study? (Y/N)		y	4. If answered "Y" to *Question 1*, then fill in dilution values from mixing zone study		
2. Is the receiving waterbody fresh water? (Y/N)		y	Dilution @ ZID (from study)		10
3. If answered "N" to *Question 1*, then fill in the following table			Dilution @ MZ (from study)		100
Eff. Flow Rate	MGD	*	5. Please enter *Water Hardness Data* below to reflect critical conditions (values from 25 to 400 mg/l)		
Stream Flow: 7Q10	CFS	*	Upstream	mg/L $CaCO_3$	100
Stream Flow: 1Q10	CFS	*	Upstream	mg/L $CaCO_3$	25
% dilution at ZID	%	10%	ZID boundary	mg/L $CaCO_3$	33
% dilution at MZ	%	25%	MZ boundary	mg/L $CaCO_3$	26
Calculated dilution Factors			6. Please enter statistical *Confidence* and *Probability* values (note: defaults already entered)		
Dilution @ ZID		na	Confidence Level	%	99%
Dilution @ MZ		na	Probability Basis	%	95%

Determine Monitoring Reqs.		Identify Pollutants of Concern					Determine In-Stream Conc.			Determine Reasonable Potential			
Pollutant Parameter	Evaluation Required?	# of Samples	Highest Effluent Conc.	Coefficent of Variation	Estimated Max Eff. Conc.	RP at end of pipe?	Ambient Conc.	Max Total Conc. at ZID	Max Total Conc. at RMZ	WQ CRITERIA 1 Hour (CMC)	WQ CRITERIA 4 Day (CCC)	Is there Reasonable Potential to Exceed? (Y/N) Acute	Is there Reasonable Potential to Exceed? (Y/N) Chronic
	(Y/N)		µg/l	Default=0.6	µg/l	(Y/N)	µg/l	µg/l	µg/l	µg/l	µg/l		
Table 1 Effluent Parameters for all POTWs w/a Flow > 0.1 MGD													
Ammonia (as N)	Yes	Evaluation occurs on Ammonia (NH3) spreadsheet page											
Chlorine (total residual, TRC)	Yes	Evaluation occurs on Chlorine (-Cl) spreadsheet page											
Dissolved oxygen	Yes	Evaluation occurs on Dissolved Oxygen (DO) spreadsheet page											
Oil and Grease	Yes	Compare to Effluent limits in permits or Federal Effluent Limit Guidelines											
Total dissolved solids	Yes	Compare to Effluent limits in permits or Federal Effluent Limit Guidelines											
Table 2 Effluent Parameters for Selected POTWs													
Hardness (Total as CaCO3	Must be collected for metals criteria calculation. Submit data to the fields at the top of the spreadsheet												
Table 2: Metals (total recoverable), cyanide and totoal phenols													
ARSENIC III	Yes	4	1.00	0.60	3.20	No	*	--	--	360.0	190.0	--	--
Cadmium	Yes	10	2.00	0.60	4.20	Yes	2.00	2.22	2.02	1.1	0.4	YES	YES
Chromium III	Yes	4	0.50	0.60	1.60	No	*	--	--	691.7	88.1	--	--
Chromium VI	Yes	4	0.50	0.60	1.60	No	*	--	--	16	11.0	--	--
Copper	Yes	4	1.00	0.60	3.20	No	*	--	--	17.4	11.7	--	--
Iron: dissolved	Yes	4	1.00	0.60	3.20	No	*	--	--	na	1000.0	--	--
Lead	Yes	10	0.20	0.60	0.42	No	0.4	--	--	19.5	0.6	NO	NO
Mercury	Yes	4	0.00	0.60	0.00	No	*	--	--	2.4	0.0	--	--
Nickel	Yes	4	1.00	0.60	3.20	No	*	--	--	548.0	60.0	--	--
Selenium	Yes	4	1.00	0.60	3.20	No	*	--	--	260.0	35.0	--	--
Silver	Yes	10	1.00	0.60	2.10	Yes	1.80	1.83	1.80	0.6	0.1	YES	YES
Zinc	Yes	4	0.00	0.60	0.00	No	*	--	--	45.2	33.6	--	--
Cyanide (Free)	Yes	4	0.00	0.60	0.00	No	*	--	--	22.0	5.2	--	--
Table 2: Volatile organic compounds													
Table 2: Acid-extractable compounds													
pentachlorophenol	*	4	nd	0.60	--	Non-Det.	*	--	--	20.0	13.0	--	--
Table 2: Base-neutral compounds													

Figure 5-1 Explanation

12 The PW enters any remaining *values* into the "**General Facility Information**" portion of the spreadsheet.

13 Where additional effluent characterization was required in the Sampling Plan, the PW enters the updated "**# of samples**" collected, "**Highest (sample) Conc.**" and calculated "**Coefficient of Variation**" into the spreadsheet.

14 The spreadsheet will re-calculate and report a "***Calculated Max. Eff. Conc.***" and compare it to the water quality criterion.

15 The PW should check each revised parameter to determine if there is still a potential to exceed WQ criteria (at end of pipe).

16 If there is no longer a potential to exceed the WQ criteria, the "Yes" reported in the "Exceed WQ at End of Pipe?" column would have changed to "No", and no further action is required for that pollutant parameter.

5.2 General Facility Information

The *General Facility Information* box (**Figure 5-2**) contains the general facility and receiving water characterization information such as fresh/marine status, flow rates, available dilution, hardness and the statistical values used in the calculations. The permit writer needs to complete this information to conduct the RPA. Please note that the boxes for the **Aquatic Toxicity** and **Human Health** RPAs have slight differences in ambient flow rates used and the need for harness information.

Figure 5-2
General Facility Information

Please complete the following General Facility Information					
1. Do I have dilution values from a mixing zone study? (Y/N)		y	**4.** If answered "Y" to *Question 1*, then fill in dilution factors from mixing zone study		
2. Is the receiving waterbody fresh water? (Y/N)		y	Dilution @ ZID (from study)		10
3. If answered "N" to *Question 1*, then fill in the following table			Dilution @ MZ (from study)		100
Eff. Flow Rate	MGD	*	**5.** Please enter *Water Hardness Data* below to reflect critical conditions (values from 25 to 400 mg/l)		
Stream Flow: 7Q10	CFS	*	Effluent	mg/L $CaCO_3$	28
Stream Flow: 1Q10	CFS	*	Up-stream	mg/L $CaCO_3$	25
% dilution at ZID	%	10%	ZID boundary	mg/L $CaCO_3$	25
% dilution at MZ	%	25%	MZ boundary	mg/L $CaCO_3$	25
Calculated dilution Factors			**6.** Please enter statistical *Confidence* and *Probablity* values (note: defaults already entered)		
Dilution @ ZID		na	Confidence Level	%	99%
Dilution @ MZ		na	Probability Basis	%	95%

5.2.1 Flow Rates

Depending upon the type of RP analysis being conducted (i.e. *aquatic toxicity* vs *human health*), various ambient and facility low flow conditions are used in the analysis. The flow conditions used are:

- *1Q10:* The minimum 1-day flow which occurs once in 10 years on average
- *7Q10:* The minimum 7-day flow which occurs once in 10 years on average
- *30Q5:* The minimum 30-day flow which occurs once in 5 years on average
- *Harmonic Mean Flow:* This is the number of daily flow measurements divided by the sum of the reciprocals of the flows (that is, the reciprocal of the mean of reciprocals).
- *Geometric Mean*: is a type of mean or average, which indicates the central tendency of a set of numbers where the numbers are multiplied and then the nth root of the resulting product is taken. The geometric mean of a data set $\{a_1, a_2, \ldots, a_n\}$ is given by:

$$\left(\prod_{i=1}^{n} a_i\right)^{1/n} = \sqrt[n]{a_1 a_2 \cdots a_n}.$$

- *Average Dry-Weather Design Flow:* (ADWDF) This is considered a "base flow" condition for a sewer collection area that is exclusive of additions due to inflow and infiltration or storm water additions.

In some cases, adequate data to calculate these flow conditions might not be readily available. There are a variety of accepted hydrologic and statistical approaches that might be used to project, interpolate, correlate or represent a data set to calculate these conditions. When used, a description of the hydrologic/statistical approach used should be included in the PER and, if necessary, requirements to collect additional data in the permit condition.

Table 5-1
Summary of RPA Variables

RPA Type	Effluent Conc.	Ambient Conc.	Effluent Flow Rate	Ambient Flow Rate	%Confidence / %Probability
Aquatic Life: Acute	Max Conc.	• **1-3 samples:** Max. Conc. • **≥4 samples:** 90th percentile	See **RMZ IMD Part 2, Sec. 4.4**	1Q10	99% / 95%
Aquatic Life: Chronic	Max Conc.	• **1-3 samples:** Max. Conc. • **>4 samples:** 90th percentile	See **RMZ IMD Part 2, Sec. 4.4**	7Q10	99% / 95%
Human Health	• **Carcinogens** Geometric Mean • **Non-Carcin.** Max Conc.	Geometric Mean	• **Carcinogens** Average Annual Flow • **Non-Carcin.** ADWDF	• **Carcinogens** Harmonic Mean Flow • **Non-Carcin.** 30Q5[50]	NA

5.2.2 In-Stream Dilution

The RPA is essentially a simple in-stream water quality model that estimates the impacts of an effluent upon a receiving water body. One of the key variables in this model is the available dilution. The **RPA Workbook** allows for two methods of incorporating the available dilution. The first is to use a factor derived from a *Mixing Zone Analysis* per departmental guidance (***Regulatory Mixing Zone IMD***). The second is to use a default factor calculated directly from the ratio of discharge and stream flow rates, with an allowance fraction[51]. The *General Facility Box* has a series of questions and answers that, depending on how the permit writer answers, can facilitate either method. The permit writer must place a "*y*" or "*n*" in the appropriate box (Question #1) to tell the spreadsheet which method to employ.

Most major, and many minor facilities, should have conducted a mixing zone study to determine the available dilutions at the edge of the zone of initial dilution and the edge of the mixing zone. This analysis must be conducted in accordance to the Department's guidance and will result in the calculation of a series of dilution factors specifically for

[50] If the effects from certain non-carcinogens are manifested after a lifetime of exposure, then harmonic mean flow may be appropriate, (EPA TSD, p. 89)
[51] In both cases a mixing zone is established, but the difference lies in how the dilution factors are determined.

use in *Aquatic Toxicity* and *Human Health* RPAs. Permit writer should enter mixing zone factors into the indicted spaces (**Question #4**). These factors will typically be listed in the **Mixing Zone Analysis Report**.

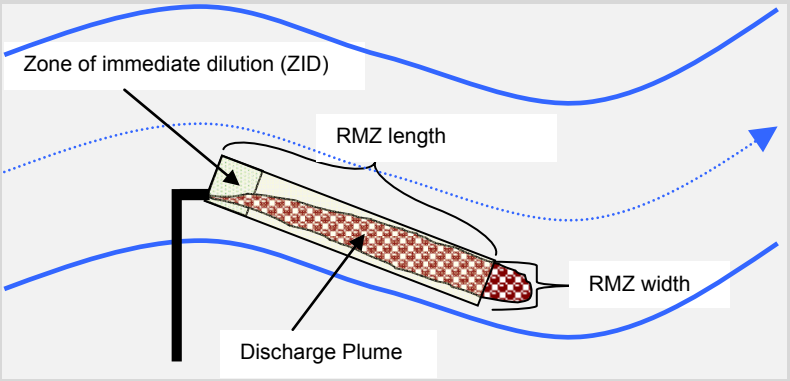
Primer on Regulated Mixing Zones

A regulatory mixing zone (RMZ) is an area defined in an NPDES permit where:
1. A discharge undergoes initial dilution and mixing in the receiving stream;
2. Water quality standards can be suspended for a short distance downstream of a discharge provided several conditions are met (see RMZ IMD Part 1); and
3. Mixing zones are designed to be protective of human health, aquatic habitat and the water body as a whole.

A RMZ is comprised of a both a chronic and acute mixing zone. The chronic mixing zone is the area encompassed by the entire RMZ and the water quality criteria for both aquatic toxicity (chronic) and human health must be met at the boundary.

The acute mixing zone or "Zone of Immediate Dilution" (ZID) is the area immediately surrounding the outfall and within the RMZ. In this area, the acute and chronic aquatic life criteria may be exceeded as long as lethal impacts prevented.

Example of Regulatory Mixing Zone (RMZ) for a River



If no mixing zone analysis is available, the **RPA Workbook** has the ability to calculate available dilution using the *Design Flow*[52] of the facility and various stream flow conditions (**Question #3**). A summary of the various flow rates and conditions used for the RPAs is included in **Table 5-1**. The permit writer should refer to the department's mixing zone guidance for an explanation of how to calculate the various flow values. The databases listed in **Table 4-1** are sources of stream flow data that can the basis of flow value calculations. The permit writer might also contact the regional Plan Review Engineer for additional information regarding facility flow performance.

[52] The flow that the facility was built to handle

5.2.3 Fresh/Marine Water Status

The state toxic water quality criteria vary based upon the type of water body; marine or freshwater. The permit writer must place a "*y*" (for fresh water) or "*n*" (for marine water) in the appropriate box (Question #2) to tell the spreadsheet which set of water quality criteria to employ. The permit writer should request technical assistance when the salinity of the receiving water can not readily be determined (ie. the receiving water is between 1 and 10 ppt).[53]

Fresh and Marine Waters Determination Process

The following salinity values are used to determine the status of the receiving water. Geographic salinity data is available on the Department's LASAR database and on the **QNET: Permit Writers Corner**

- All waters with a salinity less than **1** parts per thousand (PPT) of salinity are considered ***fresh waters*** and use the fresh water criteria.
- All waters with a salinity greater than **10** PPT of salinity are considered ***marine waters*** and use the marine water criteria
- All waters with salinity between **1** and **10** PPT of salinity must meet the **more conservative** of the fresh or marine water quality criteria

5.2.4 Hardness

For most metals, the state aquatic toxicity water quality criteria are dependent upon the hardness of the receiving water. Therefore, it is necessary to enter effluent and ambient hardness information to calculate the water quality criteria and model the effluent's impact upon the receiving waters. Effluent hardness data must be included with the applicants monitoring data. Ambient hardness data can usually be found on the Department's **LASAR** or other governmental database (see **Table 4-1**). Data entered should be reflective of the average effluent and ambient flow conditions being modeled. For example, a permit writer should calculate the average ambient hardness from data taken during the dry season, low flow condition or other appropriate seasonal condition based on the mixing zone study critical time period.

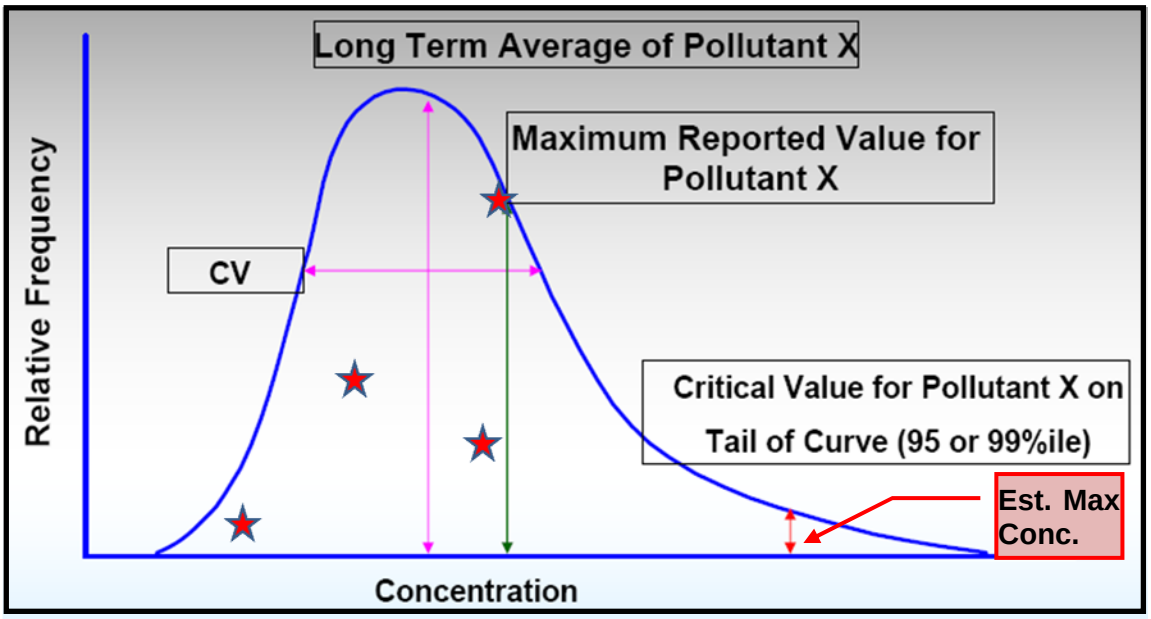
[53] It should be noted that EPA's WET testing protocols are also salinity based but used different salinity levels than state water quality critieria.

5.2.5 Statistical Calculation Values

The RPA calculates a log-normal distribution curve from the effluent data and then projects an "*Estimated Maximum Effluent Concentration*"[54] at a specified *Probability Basis* and *Confidence Level* (i.e. **Figure 5-2**). The *Probability Basis* reflects the upper boundary of the effluent distribution curve and the *Confidence Level* indicates the reliability of the estimated maximum effluent concentration. The statistical values recommended by the Department are included, by default, in the **RPA Workbook**. A permit writer may use best professional judgment to determine alternative values and the decision criteria should be included in the PER.

The values used in the *Aquatic Toxicity* and *Human Health* Analysis are summarized in **Table 5-1**. For a more detailed discussion of the statistics used in the RPA, please refer to **Section 3.3** of the **TSD**.

Figure 5-2
Example of a Log-Normal Distribution of Effluent Data



5.3 Revised Effluent Characterization Data

Working from the partially completed RPA spreadsheets from **Step 3**, the permit writer should revise the data entered for those pollutant parameters identified as a POC and where Tier 2 monitoring information was collected or located. Typical revisions include an update to the "# of Samples", reevaluation of the *Maximum Effluent Concentration* (Aquatic Toxicity), re-calculation of the *Effluent Concentration* (Human Health) and the calculation of a *Coefficient of Variation*[55].

[54] "The estimated maximum concentration is the upper bound of the expected lognormal distribution of effluent concentrations at a high confidence level.
[55] See Section 3.3 of this IMD for information in calculation of a CV

Once completed, the spreadsheets will automatically re-calculate the *Estimated Maximum Effluent Concentration*. If the estimated effluent concentration is equal to or exceeds the water quality criteria, then a "*Yes*" will be entered into the column entitled "**Exceed WQ at end of Pipe?**". Pollutant parameters that exceed the criteria at the end of pipe require ambient water characterization. Note: The Permit Writer should maintain electronic and paper copies of both the partially completed **RPA Workbook** and revised version for the record.

5.4 Data Interpretation

Since the RPA is a statistical analysis that requires multiple data points, it is subject to greater uncertainty when based upon a single or relatively few data points. Due to the large number of water quality criteria that are below available analytic limits, this can be a relatively common occurrence. This is part of the reason that additional monitoring is typically required for identified POCs. Even after additional data is collected in the Tier 2 monitoring, there might only be one, two or three detects out of a sample set of ten. In these instances, the permit writer might consider contacting Surface Water Management for technical assistance in using one of the following alternative RPA processes:

- Single data point: Since a distribution curve cannot be developed around a single data point, the permit writer should utilize a "Qualitative RPA" according to the guidelines discussed in Section 6.3.3 of the **USEPA's NPDES Permit Writers Manual** (Sept. 2010) and Section 3.2 of the **TSD**.
- Two to three data points: Based upon permit writer discretion, an alternative statistical analysis technique may be considered. For example, the **TSD** (p. E-10) recommends the use of a Delta-Lognormal Distribution analysis in cases when the data contain a mixture of non-detect values and values above the detection limit. Other methods include Maximum Likelihood Estimation (MLE) or Regression on Order Statistics (ROS)

The permit writer should also consider the potential of "false positives" due to sampling error or upset facility condition when evaluating characterization data.

- False positive: If there is conclusive information that a data point was a false positive due to laboratory error, the permit writer may remove the data point from the analysis and document the decision in the PER.
- Upset condition: If there is conclusive information that a data point was a false positive due to an upset condition, the permit writer should work with the permittee to develop and implement mitigation or operational practices to ensure that the upset condition does not re-occur. The terms of this should be included in the PER. The data point may then be removed from the analysis. Later, if another monitoring event detects a similar upset condition, even after the implementation of the mitigation or operation practices, it should be considered representative of the effluent and used in subsequent analysis.

5.5 Ambient Concentration

The goal of the ambient monitoring is to determine the condition of the receiving water body and identify the available assimilative capacity for each POC. *Assimilative Capacity* is the capacity of a natural body of water to receive wastewaters or toxic materials without exceeding water quality criteria. In cases where there is assimilative capacity, Departmental regulations may allow for the designation of a Regulatory Mixing Zone (RMZ). The RMZ is a small area around the outfall where suspension of water quality criteria are allowed as long as lethality is prevented and the integrity of the water body as a whole is protected. When a RMZ is permitted, the RPA is calculated at the regulatory boundary of the RMZ.

In cases where the ambient pollutant concentrations exceed the corresponding water quality criteria, no assimilative capacity is available and a RMZ is not permitted for that particular pollutant. In cases where the ambient pollutant concentrations are below the corresponding water quality criterion, assimilative capacity is available and a RMZ might be allowed per the Department's mixing zone guidance (***Regulatory Mixing Zone IMD***).

In cases where the stream segment of the receiving water body has been listed on the 303(d) list as "*Water Quality Limited*" (Cat 5), even if data indicates that assimilative capacity is available, RMZs may not be permitted[56]. The implications of this is that any POC discharged to a water body listed as water quality limited for the same pollutant will have reasonable potential and require an effluent limit calculated to meet the water quality criterion at the end of pipe.

Once the background concentrations are put into the RPA spreadsheet under the "*ambient concentrations*" column, the spreadsheet automatically calculates whether assimilative capacity is available and, if allowed, factors in dilution data to determine the M*aximum Effluent Concentration* at the acute (ZID) and chronic (RMZ) mixing zone boundaries. This maximum concentration is essentially the total concentration value when the ambient pollutant concentration and effluent concentrations are combined and allowed to mix within the ZID and mixing zone.

[56] In these instances where assimilative capacity is available, the permit writer should consider supplying ambient monitoring data to the DEQ Lab for inclusion into the LASAR database. This data would subsequently be evaluated as part of the Sate-wide Water Quality Assessment and might lead to a segmentation of the listed water body. This might result in the "Water Quality Limited" status being limited to only the segments where the criteria are actually being exceeded.

5.5.1 Data Entry Instructions

The permit writer would enter the data collected in the **Tier 2** Monitoring into the RPA Workbook column entitled "*Ambient Conc*." using the following guidelines:

Ambient Data guidelines for use in RPA Calculation

- **Aquatic Toxicity Analysis**
  - For 4 or more data points, the permit writer would enter the **90th percentile** of the data range
  - For less than 4 data points, the permit writer would enter the **most conservative value**
- **Human Health Analysis**
  - The permit writer should calculate and enter the **geometric mean**

In cases where the receiving water body is listed on the **303d list** as "Water Quality Limited" for a POC, the permit writer should set the "*Ambient Conc.*" to equal either the highest water quality criteria value or, an even higher recorded ambient concentration. This will effectively remove all dilution from the calculation. The permit writer should make a note of the actual ambient value in the "*RPA Run Notes:*"[57]. This is demonstrated in **Figure 5-3**.

[57] To set the ambient concentration equal to the water quality criteria, the permit writer should enter a "=" followed by the cell number of the highest criterion in the "*Ambient Conc.*" cell.

Figure 5-3
Example of 303(d) Procedure

RPA Run Information	
Facility Name:	Anytown POTW
DEQ File Number:	12345
Permit Writer Name:	Ivana Permit
Outfall Number:	1
Date of RPA Run:	6/1/2013

RPA Run Notes: Waterbody is 303(d) listed for Silver. The 90th % value for the ambient concentration was 0.5 ug/l. Due to listing status, a value of 1.8 ug/l was used.

KEY: - Intermediate calc.s
* Enter data here -- Calculated results

Please complete the following General Facility Information		
1. Do I have dilution values from a mixing zone study? (Y/N)		y
2. Is the receiving waterbody fresh water? (Y/N)		y
3. If answered "N" to *Question 1*, then fill in the following table		
Eff. Flow Rate	MGD	*
Stream Flow: 7Q10	CFS	*
Stream Flow: 1Q10	CFS	*
% dilution at ZID	%	10%
% dilution at MZ	%	25%
Calculated dilution Factors		
Dilution @ ZID		na
Dilution @ MZ		na

4. If answered "Y" to *Question 1*, then fill in dilution values from mixing zone study		
Dilution @ ZID (from study)		10
Dilution @ MZ (from study)		100
5. Please enter *Water Hardness Data* below to reflect critical conditions (values from 25 to 400 mg/l)		
Effluent	mg/L $CaCO_3$	100
Up-stream	mg/L $CaCO_3$	25
ZID boundary	mg/L $CaCO_3$	33
MZ boundary	mg/L $CaCO_3$	26
6. Please enter statistical *Confidence* and *Probablity* values (note: defaults already entered)		
Confidence Level	%	99%
Probability Basis	%	95%

Determine Monitoring Reqs.	Identify Pollutants of Concern						Determine In-Stream Conc.			Determine Reasonable Potential			
PARAMETER	Evaluation Required?	# of Samples	Highest Effluent Conc.	Coefficent of Varience	Estimated Max Eff. Conc.	RP at end of pipe?	Ambient Conc.	Max Total Conc. at ZID	Max Total Conc. at RMZ	WQ CRITERIA 1 Hour (CMC)	WQ CRITERIA 4 Day (CCC)	Is there Reasonable Potential to Exceed? (Y/N) Acute	Is there Reasonable Potential to Exceed? (Y/N) Chronic
	(Y/N)		ug/l	Default=0.6	ug/l	(Y/N)	ug/l	ug/l	ug/l	ug/l	ug/l		
Table 1 Effluent Parameters for all POTWs w/a Flow > 0.1 MGD													
Ammonia (as N)	Yes	Evaluation occurs on Ammonia (NH3) spreadsheet page											
Chlorine (total residual, TRC)	Yes	Evaluation occurs on Chlorine (-Cl) spreadsheet page											
Dissolved oxygen	Yes	Evaluation occurs on Dissolved Oxygen (DO) spreadsheet page											
Oil and Grease	Yes	Compare to Effluent limits in permits or Federal Effluent Limit Guidelines											
Total dissolved solids	Yes	Compare to Effluent limits in permits or Federal Effluent Limit Guidelines											
Table 2 Effluent Parameters for Selected POTWs													
Hardness (Total as CaCO3)	Must be collected for metals criteria calculation. Submit data to the fields at the top of the spreadsheet												
Table 2: Metals (total recoverable), cyanide and totoal phenols													
ARSENIC III (State Only)	Yes	4	1.00	0.60	3.20	No	*	--	--	360.0	190.0	--	--
Cadmium	Yes	10	2.00	0.60	4.20	Yes	2.00	2.22	2.02	1.1	0.4	YES	YES
Chromium III + (State Only)	Yes	4	0.50	0.60	1.60	No	*	--	--	691.7	68.1	--	--
Chromium VI (State Only)	Yes	4	0.50	0.60	1.60	No	*	--	--	16.0	11.0	--	--
Copper	Yes	4	1.00	0.60	3.20	No	*	--	--	6.1	3.7	--	--
Iron: dissolved (State Only)	Yes	4	1.00	0.60	3.20	No	*			na	1000.0	--	--
Lead	Yes	10	0.20	0.60	0.42	No		0.94	0.9	5	0.6	NO	NO
Mercury	Yes	4	0.00	0.60	0.00	No		--	--		0.0	--	--
Nickel	Yes	4	1.00	0.60	3.20	No		--	--		50.0	--	--
Selenium	Yes	4	1.00	0.60	3.20	No	*	--	--	260.0	35.0	--	--
Silver	Yes	10	1.00	0.60	2.10	Yes	1.80	1.83	1.80	0.6	0.1	YES	YES
Zinc	Yes	4	0.50	0.60	1.60	No	*	--	--	45.2	33.6	--	--
Cyanide (Free)	Yes	4	1.00	0.60	3.20	No	*	--	--	22.0	5.2	--	--
Table 2: Volatile organic compounds													
Table 2: Acid-extractable compounds													
Pentachlorophenol	Yes	4	nd	0.60	--	Non Dect.	*	--	--	20.0	13.0	--	--

Figure 5-3 Explanation

17 For each remaining POC, the PW enters the appropriate value for ambient pollutant concentration into the "***Ambient Conc.***" Column.

18 If the receiving stream segment is 303(d) listed for an POC then no mixing zone is permitted. The ambient value must be set to a value equal to or greater than the highest water quality criteria. See example.

19 The PW should describe any changes due to listing status in the RPA Run Notes of the spreadsheet and PER.

20 The spreadsheet will then calculated the pollutant concentrations at the various mixing zone boundaries (if allowed) and RP status.

5.6 Comparison of Maximum Concentration to Water Quality Concentration

In the case of the human health toxicity calculation, a maximum in-stream concentration will be calculated. If there is available assimilative capacity and a mixing zone is allowed, the calculated maximum concentration will reflect dilution and be calculated to reflect conditions at the boundary of the mixing zone (RMZ). The aquatic toxicity spreadsheet will employ a similar calculation, with the addition of a calculation to determine the concentration at the boundary of the acute mixing zone (ZID). The spreadsheet will then compare each calculated maximum concentration to the applicable water quality criteria and indicate the results in the "*Is there Reasonable Potential to Exceed*" column. A report of "*yes*" indicates that there is reasonable potential and a report of "*no*" indicates that there is not reasonable potential. An example of an aquatic toxicity calculation is illustrated in **Figure 5-4**, below.

Figure 5-4
Example of RPA analysis

RPA Run Information	
Facility Name:	Anytown POTW
DEQ File Number:	12345
Permit Writer Name:	Ivana Permit
Outfall Number:	1
Date of RPA Run:	6/1/2013
RPA Run Notes: Waterbody is 303(d) listed for Silver. The 90th % value for the ambient concentration was 0.5 ug/l. Due to listing status, a value of 1.8 ug/l was used.	
KEY:	-- Intermediate calc.s
* Enter data here	-- Calculated results

Please complete the following General Facility Information		
1. Do I have dilution values from a mixing zone study? (Y/N)		y
2. Is the receiving waterbody fresh water? (Y/N)		y
3. If answered "N" to *Question 1*, then fill in the following table		
Eff. Flow Rate	MGD	*
Stream Flow: 7Q10	CFS	*
Stream Flow: 1Q10	CFS	*
% dilution at ZID	%	10%
% dilution at MZ	%	25%
Calculated dilution Factors		
Dilution @ ZID		na
Dilution @ MZ		na

4. If answered "Y" to *Question 1*, then fill in dilution values from mixing zone study	
Dilution @ ZID (from study)	10
Dilution @ MZ (from study)	100

5. Please enter *Water Hardness Data* below to reflect critical conditions (values from 25 to 400 mg/l)		
Effluent	mg/L $CaCO_3$	100
Up-stream	mg/L $CaCO_3$	25
ZID boundary	mg/L $CaCO_3$	33
MZ boundary	mg/L $CaCO_3$	26
6. Please enter statistical *Confidence* and *Probability* values (note: defaults already entered)		
Confidence Level	%	99%
Probability Basis	%	95%

Determine Monitoring Reqs.		Identify Pollutants of Concern					Determine In-Stream Conc.			Determine Reasonable Potential			
PARAMETER	Evaluation Required?	# of Samples	Highest Effluent Conc.	Coefficent of Varience	Estimated Max Eff. Conc.	RP at end of pipe?	Ambient Conc.	Max Total Conc. at ZID	Max Total Conc. at RMZ	WQ CRITERIA 1 Hour (CMC)	WQ CRITERIA 4 Day (CCC)	Is there Reasonable Potential to Exceed? (Y/N) Acute	Is there Reasonable Potential to Exceed? (Y/N) Chronic
	(Y/N)		µg/l	Default=0.6	µg/l	(Y/N)	µg/l	µg/l	µg/l	µg/l	µg/l		
Table 1 Effluent Parameters for all POTWs w/a Flow > 0.1 MGD													
Ammonia (as N)	Yes	Evaluation occurs on Ammonia (NH3) spreadsheet page											
Chlorine (total residual, TRC)	Yes	Evaluation occurs on Chlorine (-Cl) spreadsheet page											
Dissolved oxygen	Yes	Evaluation occurs on Dissolved Oxygen (DO) spreadsheet page											
Oil and Grease	Yes	Compare to Effluent limits in permits or Federal Effluent Limit Guidelines											
Total dissolved solids	Yes	Compare to Effluent limits in permits or Federal Effluent Limit Guidelines											
Table 2 Effluent Parameters for Selected POTWs													
Hardness (Total as CaCO3	Must be collected for metals criteria calculation. Submit data to the fields at the top of the spreadsheet												
Table 2: Metals (total recoverable), cyanide and totoal phenols													
ARSENIC III (State Only)	Yes	4	1.00	0.60	3.20	No	*	--		360.0	190.0	--	
Cadmium	Yes	10	2.00	0.60	4.20	Yes	2.00	2.22	2.02	1.1	0.4	YES	YES
Chromium III + (State Only)	Yes	4	0.50	0.60	1.60	No	*	--		691.7	88.1	--	
Chromium VI (State Only)	Yes	4	0.50	0.60	1.60	No	*	--	--	16.0	11.0	--	--
Copper	Yes	4	1.00	0.60	3.20	No	*	--	--	6.1	3.7	--	--
Iron: dissolved (State Only)	Yes	4	1.00	0.60	3.20	No	*	--	--	na	1000.0	--	--
Lead	Yes	10	0.20	0.60	0.42	No	1.00	0.94	0.99	19.5	0.6	NO	NO
Mercury	Yes	4	0.00	0.60	0.00	No	*	--	--	2.4	0.0	--	--
Nickel	Yes	4	1.00	0.60	3.20	No	*			48.0	50.0	--	--
Selenium	Yes	4	1.00	0.60	3.20	No	*	--	--	260.0	35.0	--	--
Silver	Yes	10	1.00	0.60	2.10	Yes	1.80	1.83	1.80	0.6	0.1	YES	YES
Zinc	Yes	4	0.50	0.60	1.60	No	*	--	--	45.2	33.6	--	--
Cyanide (Free)	Yes	4	1.00	0.60	3.20	No	*	--	--	22.0	5.2	--	--
Table 2: Volatile organic compounds													
Table 2: Acid-extractable compounds													
Pentachlorophenol	Yes	4	nd	0.60	--	Non Dect.	*	--	--	20.0	13.0	--	--

5.7 Troubleshooting

Since all the calculation variables have already been entered, there is little to do in this step other than trouble-shoot the process and evaluate the results. When receiving water body information is entered into the *General Facility Information* section, the applicable water quality criteria will be calculated and reported in the "*WQ Criteria*" columns. If the word "*data*" appears in the columns, either dilution or hardness data is missing. If a "0" appears in the column, a value less than zero was calculated and the field is not set to report to the appropriate decimal point. If there is not an acute or chronic water quality criterion for a particular pollutant parameter, a "*na*" will be reported in the applicable field.

5.8 Conclusions

Before completing the RPA and calculating effluent limits, the permit writer should evaluate the results to ensure accuracy. Probably the most relevant question is "*do the results make sense*?" **Line 1** in **Figure 5-5** below is a good example. Here the maximum concentration at the boundary of the mixing zone (RMZ) was reported as 0.00 ug/l as compared to the reported concentration of 0.0 ug/l, resulting in "*yes*" for reasonable potential to exceed the chronic criteria. In this case it would be prudent to check the calculated water quality criteria value by expanding the number of decimal points reported in both fields. This would result in a maximum concentration of 0.0013 ug/l vs. the water quality criteria of 0.0010 ug/l[58].

Figure 5-5
Example of RPA Evaluation

		Determine In-Stream Conc.			Determine Reasonable Potential			
	RP at end of pipe?	Ambient Conc.	Max Total Conc. at ZID	Max Total Conc. at RMZ	WQ CRITERIA 1 Hour (CMC)	WQ CRITERIA 4 Day (CCC)	Is there Reasonable Potential to Exceed? (Y/N) Acute	Chronic
	(Y/N)	ug/l	ug/l	ug/l	ug/l	ug/l		
	Non Dect.	*	--	--	20.0	13.0	--	--
	--	*	--	--	3.0	na	--	--
	--	*	--	--	1.0	0.1	--	--
	--	*	--	--	2.4	0.0	--	--
	--	*	--	--	0.1	0.0	--	--
	--	*	--	--	na	0.1	--	--
Line 1	**Yes**	0.00	0.00	0.00	1.1	0.0	**NO**	**YES**
	--	*	--	--	0.2	0.0	--	--

[58] Although the calculated maximum concentration (0.0013 ug/l) was greater than the calculated water quality criteria (0.0010 ug/l), these results might be within the range of analytic variability and the permit writer should consult the department's policy on rounding and significant digits when ultimately determining whether there is reasonable potential.

In some cases where RP is indicates, the permit writer may consider conducting an intake credit analysis. As long as a number of statutory conditions are met, the analysis allows the permit writer to consider pollutant concentrations originating from the municipalities or industries source water as a credit when determining RP or determining compliance with a WQBEL. Please refer to **Appendix F** for guidance on the use and calculation of an intake credit. The data required for this analysis is similar in scope to the requirements for calculating a Site Specific Background Pollutant Criterion. At this point, the permit writer should keep this option in mind, but the actual application of the criterion approach should not be undertaken until after a WQBEL has been calculated in **Step 6**. The criterion approach would then determine an alternative criterion, upon which a new RPA and WQBEL calculation would be conducted.

5.9 Next Steps

Once the permit writer has evaluated and confirmed the results of the RPA, they should determine the applicable effluent limit as described in the next Section. The **RPA Workbook** has been designed to link the RPA spreadsheet with the effluent limit calculation spreadsheet. The general facility information and ambient/effluent water quality data will be automatically transferred to the effluent limit calculation spreadsheet.

Section 6: Effluent Limit Calculation and Determination

6.1 Effluent Limit Determination Process Overview

Once the permit writer has conducted the RPA and determines that a facility has reasonable potential to exceed the in-stream water quality criteria, **Step 6** is to calculate the Waste Load Allocations[59] (WLA) and derive Water Quality Effluent Limits (WQBELs). Much of this process occurs automatically as relevant data is transferred from the RP spreadsheets to the Effluent Limits spreadsheets of the **RPA Workbook**[60].

Because of the statistical variability of the effluent concentration and the lack of a probability basis, it is necessary to translate the WLAs into WQBELs to ensure proper implementation and enforcement. In 303-d listed stream segments where a formal TMDL has been completed and WLA's assigned, the permit writer must translate the TMDL's WLAs into WQBELs. In some cases, it might be possible to use an intake credit in determining compliance with the calculated WQBEL.

Once calculated, the permit writer would compare the derived limits (WQBEL or TMDL based) with any applicable Technology Based Effluent Limits (TBEL), and select the value that is most protective of the receiving water body. The elements of this process are presented in **Figures 6-1**.

6.2 WLA and WQBEL Calculation

The Department has developed methodology from EPA's 1991 Technical Support Document (TSD) to calculate WLAs and WQBELs to be protective of applicable water quality criteria in the receiving water. This methodology accounts for the allowable dilution, background concentration, effluent variability, and sampling frequency to calculate a WQBEL. **Table 5-1** summarizes the critical conditions (effluent concentration, background concentration, effluent flow, etc.) that are used in effluent limit calculation to be protective of aquatic life and human health.

As previously mentioned, data and results are automatically transferred from the RPA spreadsheet to the WQBEL Calculation spreadsheet. Of particular interest will be the RPA results that trigger the calculation of effluent limits. The only additional information the spreadsheet will require to be entered by the permit writer is the

[59] WLAs are the portion of the receiving water's TMDL that is allocated on one of its existing or future point sources of pollution so that surface water quality is protected at all flow conditions.
[60] The detailed guidance for calculating a permit effluent limit used in the workbook is described in depth in Section 5 (Permit Requirements) of **EPA's TSD**.

monitoring requirement frequency (#/mo) that will be required in the permit (as shown in **Figure 6-1**, boxed areas). These applicable areas are highlighted in orange on the spreadsheet[61].

Once the applicable data has been entered into the WQBEL spreadsheets, the WLAs and WQBELs for the applicable pollutant parameters are calculated. A summary and list of formulas used in the calculations is included in the boxes below. When available, an intake credit may be used in determining compliance with the WQBEL. Please refer to **Appendix F** for guidance in the use of intake credits and permit language.

Figure 6-1
Example of WQBEL Calculation

Or. DEQ — **Water Quality Based Effluent Limit Calculation - Aquatic Toxicity - Domestic Facility** — Rev. 2.0

RPA Run Information	
Facility Name:	Anytown POTW
DEQ File Number:	12345
Permit Writer Name:	Ivana Permit
Outfall Number:	1
Date of RPA Run:	6/1/2013

RPA Run Notes: Waterbody is 303(d) listed for Silver. The 90th % value for the ambient concentration was 0.5 ug/l. Due to listing status, a value of 1.8 ug/l was used.

General Facility Information		
1. Do I have dilution values from a mixing zone study? (Y/N)		y
2. Is the receiving waterbody fresh water? (Y/N)		y
3. If answered "N" to *Question 1*, then fill in the following table		
Eff. Flow Rate	MGD	*
7Q10	CFS	*
1Q10	CFS	*
% dilution at ZID	%	10%
% dilution at MZ	%	25%
Calculated dilution factors		
Dilution @ ZID		na
Dilution @ MZ		na

4. If answered "Y" to *Question 1*, then fill in dilution values from mixing zone study		
Dilution @ ZID (from study)		10
Dilution @ MZ (from study)		100
5. Hardness Data, Taken from *Aquatic Toxicity RPA* page		
Effluent	mg/L $CaCO_3$	400
Up-stream	mg/L $CaCO_3$	25
ZID boundary	mg/L $CaCO_3$	63
MZ boundary	mg/L $CaCO_3$	29
6. Probablity basis for WLA multipliers		
Probability Basis		99%
Confidence Level: Monthly		95%
Confidence Level: Max Daily		99%

PARAMETER	Analysis req? (is there RP?) Acute	Chronic	WQ Criteria 1 Hour (CMC)	4 Day (CCC)	Ambient Conc.	Waste Load Allocations Acute	Chronic	CV	Monitoring req.	Acute LTA	Chronic LTA	Min. LTA	Effluent Limits 95% Monthly (AML)	99% Max Daily (MDL)
	(Y/N)	(Y/N)	µg/l	µg/l	µg/l	µg/l	µg/l		#/month	µg/l	µg/l	µg/l	µg/l	µg/l
Table 1 Effluent Parameters for all POTWs w/a Flow > 0.1 MGD														
Table 2 Effluent Parameters for Selected POTWs														
Table 2: Metals (total recoverable), cyanide and totoal phenols														
ARSENIC III (State Only)	--	--	--	--	--	--	--	--	*	--	--	--	--	--
Cadmium	NO	YES	--	0.4262	2	--	0	0.6	4	n/a	0	0	**0.35**	**0.70**
Chromium III + (State Only)	--	--	--	--	--	--	--	--	*	--	--	--	--	--
Chromium VI (State Only)	--	--	--	--	--	--	--	--	*	--	--	--	--	--
Copper	--	--	--	--	--	--	--	--	*	--	--	--	--	--
Iron: dissolved (State Only)	--	--	--	--	--	--	--	--	*	--	--	--	--	--
Lead	NO	NO	--	--	--	--	--	--	*	--	--	--	--	--
Mercury	--	--	--	--	--	--	--	--	*	--	--	--	--	--
Nickel	--	--	--	--	--	--	--	--	*	--	--	--	--	--
Selenium	--	--	--	--	--	--	--	--	*	--	--	--	--	--
Silver	YES	YES	1.8085	0.12	1.8	2	0	0.6	4	1	0	0	**0.10**	**0.20**
Thallium	--	--	--	--	--	--	--	--	*	--	--	--	--	--
Zinc	--	--	--	--	--	--	--	--	*	--	--	--	--	--
Cyanide (Free)	--	--	--	--	--	--	--	--	*	--	--	--	--	--

6/15/2011 — Page 1 of 2 — RPA spreadsheet Domestic rev-5 example

[61] When calculating the Average Monthly Limit (AML) as part of the Aquatic Toxicity WQBEL, it is necessary to use a value of greater than one sample per month to prevent the calculation of a value could allow an exceedance of a water quality criterion. The applicable Aquatic Toxicity WQBEL calculation spreadsheet has been set up to automatically enter a value of "*2 samples/month*" where the entered value is less than "*2*". This is not applicable to Human Health WQBEL calculations since the AML is equal to the WLA and does not factor in monitoring frequency. Please refer to the TSD p. 107 & 110 for additional guidance.

Figure 6-1 Explanation

27 For each remaining pollutant parameter where a reasonable potential determination was made, the results will be transferred from the RPA page to the effluent limit calculation page.

28 For each pollutant parameter where reasonable potential is indicated, the spreadsheet will automatically calculate the Waste Load Allocations using data from the RPA pages.

29 The permit writer will need to enter the number of monthly compliance monitoring events to calculate the effluent limits.

Summary of the Aquatic Toxicity WQBEL Calculation Process

Step 1: The first step is to calculate Waste Load Allocations (WLA) based on the acute and chronic aquatic criteria. The WLAs are calculated based on available dilution and the background concentration.

The permit writer will calculate WLAs for both chronic and acute aquatic life impacts from respective water quality criteria (WQC's). The formulas for calculating WLAs (chronic & acute) are:

$$WLA_c = Dilution_{MZ}x(WQC_{chr} - C_{background}) + C_{background}$$
$$where Dilution = (Q_{eff} + Q_{receivingwater}) / Q_{eff}$$

$$WLA_a = Dilution_{ZID}x(WQC_{acute} - C_{background}) + C_{background}$$
$$where Dilution = (Q_{eff} + Q_{receivingwater}) / Q_{eff}$$

Step 2: A corresponding Long-Term Average (LTA) is then calculated from each of the WLAs by multiplying the LTA by a statistical factor derived from the *Coefficient of Variation* (CV) of the monitoring data.

$$LTA_a = WLA_a \times e^{\left[0.5\sigma^2 - z\sigma\right]}$$
$$LTA_c = WLA_c \times e^{\left[0.5\sigma_4{}^2 - z\sigma_4{}^2\right]}$$

Step 3: The permit writer then selects the most limiting (or lower) of the acute aquatic life and chronic aquatic life LTA's to be protective of the most sensitive beneficial use.

$$LTA = min\ (LTA_{chr}, LTA_{acute})$$

Step 4: The most limiting LTA is then expressed as the Maximum Daily Limit (MDL) and/or Average Monthly Limits (AML) in the permit by multiplying the LTA by a statistical factor derived from CV, *Confidence Interval* and *monitoring frequency*.

$$MDL = LTA \times e^{\left[z\sigma\ -0.5\sigma^2\right]}$$
$$AML = LTA \times e^{\left[z\sigma_n - 0.5\sigma_n{}^2\right]}$$

Summary of the Human Health WQBEL Calculation Process

Setting limits based on human health criteria is slightly different from the procedure for aquatic toxicity because the exposure periods the criteria are based on are generally longer than a month and may extend up to 70 years. EPAs TSD recommends a slightly different methodology to account for this exposure period.

Step 1: First the WLA is calculated for both the *Water + Fish Consumption* and *Fish Consumption* water quality criteria (WQC). Depending on the carcinogen status of the pollutant parameter the dilution used for calculation varies from the *30Q5* to *Harmonic Mean*. If the back ground concentration of the receiving water body exceeds the WQC, then the WLA = WQC.

$$WLA = Dilution x (WQC - C_{background}) + C_{background}$$

$$where Dilution = (Q_{eff} + Q_{receivingwater}) / Q_{eff}$$

Step 2: The Average Monthly Limit (AML) is set equal to the minimum WLA calculated for *Water + Fish Consumption* and *Fish Consumption*.

$$AML = min\ (WLA_{Water\ +\ Fish}, WLA_{Fish})$$

Step 3: The Maximum Daily Limit (MDL) is then calculated based on the relationship between the AML and a multiplication factor statistically derived from the relationship between the *confidence level*, *coefficient of variation* and *proposed monitoring frequency*.

$$MDL = AML\ x\ M_{factor}$$

$$M_{factor} = e^{\left[z\sigma\ -0.5\sigma^2\right]} / e^{\left[z\sigma_n - 0.5\sigma_n{}^2\right]}$$

*a table of the $M_{factors}$ is included on page 106 of the TSD

6.3 Compare WQBELs with TBELs

Once the permit writer has calculated the Aquatic Toxicity and Human Health WQBELs, (both AMLs and MDLs) the next step is to compare the results to any applicable TBELs for toxic pollutants. The permit writer identifies the TBELs based upon the permitted facility's Standard Industrial Classification (SIC) code or EPA's industrial classification scheme. For each category and sub-category of process identified, the EPA has published a series of Effluent limit Guidelines (ELGs) and performance standards. These guidelines appear in 40 CFR Parts 405-499. A list of the existing ELGs with hyperlinks is provided in **Table 6-2**.

The WQBEL or TBEL with the lowest value for each criteria (Human Health and Aquatic Toxicity) and each loading type (AML and MDL) should be included in the final permit. In most cases, it will be the WQBEL that is more environmentally protective than the corresponding TBEL.

Table 6-2
Existing Effluent Limit Guidelines

Industry Category	40 CFR Part	First Promulgated
Aluminum Forming	467	1983
Asbestos Manufacturing	427	1974
Battery Manufacturing	461	1984
Canned and Preserved Fruits and Vegetable Processing	407	1974
Canned and Preserved Seafood (Seafood Processing)	408	1974
Carbon Black Manufacturing	458	1978
Cement Manufacturing	411	1974
Centralized Waste Treatment	437	2000
Coal Mining	434	1985
Coil Coating	465	1983
Concentrated Animal Feeding Operations (CAFO)	412	1974
Concentrated Aquatic Animal Production (Aquaculture)	451	2004
Copper Forming	468	1983
Dairy Products Processing	405	1974
Electrical and Electronic Components	469	1983
Electroplating	413	1981
Explosives Manufacturing	457	1976
Ferroalloy Manufacturing	424	1974
Fertilizer Manufacturing	418	1974
Glass Manufacturing	426	1974
Grain Mills Manufacturing	406	1974
Gum and Wood Chemicals	454	1976
Hospitals	460	1976
Ink Formulating	447	1975
Inorganic Chemicals	415	1982
Iron and Steel Manufacturing	420	1982
Landfills	445	2000
Leather Tanning and Finishing	425	1982
Meat and Poultry Products	432	1974
Metal Finishing	433	1983
Metal Molding and Casting (Foundries)	464	1985
Metal Products and Machinery	438	2003
Mineral Mining and Processing	436	1975
Nonferrous Metals Forming and Metal Powders	471	1985
Nonferrous Metals Manufacturing	421	1984
Oil and Gas Extraction	435	1979
Ore Mining and Dressing (Hard Rock Mining)	440	1982
Organic Chemicals, Plastics and Synthetic Fibers (OCPSF)	414	1987
Paint Formulating	446	1975
Paving and Roofing Materials (Tars and Asphalt)	443	1975
Pesticide Chemicals Manufacturing, Formulating and Packaging	455	1978
Petroleum Refining	419	1982

Table 6-2 Continued
Existing Effluent Limit Guidelines,

Industry Category	40 CFR Part	First Promulgated
Pharmaceutical Manufacturing	439	1983
Phosphate Manufacturing	422	1974
Photographic	459	1976
Plastic Molding and Forming	463	1984
Porcelain Enameling	466	1982
Pulp, Paper and Paperboard	430	1998
Rubber Manufacturing	428	1974
Soaps and Detergents Manufacturing	417	1974
Steam Electric Power Generating	423	1982
Sugar Processing	409	1974
Textile Mills	410	1982
Timber Products Processing	429	1981
Transportation Equipment Cleaning	442	2000
Waste Combustors	444	2000

6.4 Next Steps

After calculating and confirming the effluent limits, permit writers should ensure that all raw data, spreadsheets, mixing zone models and notes detailing any decision rationale are preserved in the permit file. This will help the permit writer to communicate the findings to the permit applicant and the public at the end of year three, and ensure that all required information to write the PER at the end of year five is available.

In addition to the requirements to determine if individual pollutants will have reasonable potential to exceed water quality criteria, there is also the narrative requirement (OAR 340-041-0033(1)) to "prevent the discharge of toxic substances into Oregon's waters above natural background levels in amounts that are toxic to aquatic life". The Department employs WET analysis to determine if the effluent in its entirety causes toxicity in aquatic organisms. The permit writer should refer to any current Departmental guidance or the Department's WET Testing Coordinator located at the DEQ Laboratory.

Section 7: Permit Applicant Consultation

7.1 Overview

By the end of the third year of the permit term, the permit writer has used **Tier 1** and **2** monitoring results to characterize the facility's effluent and receiving water body, and conduct a RPA. Where pollutant parameters are found to possess RP, they then calculated a WQBEL and identified any applicable TBELS, selecting the most conservative for the final permit. At this point in the permit development process (**Step 7**), the permit writer is ready to inform the permit applicant of the results and work with them to develop a management strategy for achieving regulatory compliance during the remaining two years of the permit term.

7.2 Permittee Notification of Results and Compliance Evaluation

Once the RPA and effluent limit determination process has been completed, the permit writer should notify the permittee of the results via memorandum along with a copy of the applicable spreadsheets from the RPA Workbook. Shortly thereafter, the permit writer should meet with the permit applicant to discuss the results and whether the facility is currently able to meet the proposed effluent limits.

The permit applicant should perform a technical evaluation of their current or proposed treatment facility to determine if the proposed effluent limits can be met. Given the fact that the RPA was based upon facility performance data, in most cases the applicant will need to implement a source control effort, operational change or infra-structure improvement in order to meet the proposed effluent limit. The permit writer should discuss plans with the permit applicant to identify and select the best option to ensure a pathway to compliance.

7.3 Alternatives

In some cases, a readily available management option might not exist that will ensure compliance upon renewal of the permit. The permit writer should discuss with the permit applicants the various options that are available.

In cases where a management option is feasible, the permittee may not be able to comply with a newly applicable WQBEL immediately upon permit issuance, a Compliance Schedule allowing for the use of interim effluent limits may be allowed. A permit developed incorporating a compliance schedule will typically have a series of milestones and corresponding interim effluent limits, with the final effluent limit being implemented

as soon as practicable. Please refer to the Department's guidance, **Compliance Schedules in NPDES Permits** for more information.

In cases where a management option is not feasible in the remainder of the permit term, other *Standards*-based approaches are available. These options typically require a minimum of quantitative data to demonstrate the origin and mobility of the pollutant in both the effluent and/or receiving waters. Typically, the permit writer will have required an initial look at collecting this data as part of the Tier 2 monitoring. The management options include:

- *Development of site specific water quality criteria:* The Department may apply site specific water quality criteria in the Basin Descriptions in OAR Division 340-41-033(b)(6) to reflect naturally occurring conditions. Please refer to the **Site Specific Background Pollutant Criterion IMD** (future) for guidance in the calculation and use of a criterion or contact the Surface Water Management Section for technical assistance.
- *Variance from water quality criteria:* A variance is a short-term exemption from meeting water quality standards which would otherwise be applicable to an individual discharger. It is granted for a specific pollutant(s) and does not otherwise modify the standards. It does not exempt the discharger from compliance with applicable technology-based limits (TBELs) or water quality-based limits for other pollutants. Underlying water quality standards remain in effect for all other purposes (e.g., impaired water listings, TMDL development, etc.). It is granted for a specific period of time (length of time varies by state). The discharger must either meet the standard upon the expiration of this time period or must make a renewed demonstration of "un-attainability." Often, a variance is used as a bridging mechanism to a TMDL, providing the permittee and permitting authority the time to better characterize the watershed, identify pollutant sources, and ultimately develop achievable waste load allocations.
- *Use Attainability Analysis*: The Department may remove a designated beneficial use if it can demonstrate that attaining the use is not feasible due to one of several conditions. The process by which a use is removed is a Use Attainability Analysis (UAA). This option would most typically be used where there is a naturally occurring pollutant or a legacy pollutant present in the intake and receiving waters preventing the attainment of use. Please refer to the following link for additional information.
- *(Future Implementation Tools go here)*

7.4 Selected Management Option

Once the permit applicant and the permit writer have agreed upon either a pathway to compliance by the end of the (current) permit term, compliance schedule or standards-based management option, the details should then be documented (immediately) in correspondence to the permit applicant with copies to the file, and ultimately in the permit terms and conditions of the renewed permit. The permit applicant will have the remainder of the permit term (and perhaps longer depending upon the option selected) to begin implementation the terms of the selected option and ensure that they are able to meet the requirements of the new permit without delay.

7.5 Next Step

A management option should have been selected and implementation begun within six months of the notification of results. To complete the permit renewal, the permit writer would only need to evaluate any additional characterization data mandated by the selected management option and make any necessary adjustments to the final effluent limits before issuing the final permit**.**

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Section 8: Finalization of RPA and Effluent Limits and Documentation of Decision Rational

8.1 Overview

Near the end of the permit term (**Step 8**), the permit writer will finalize the RPA using any additional characterization data collected since the initial RPA, and adjust the effluent limits accordingly. They will then document the decision making processes, calculations and any approved management options employed. The results of the RPA and effluent limit calculation process are then included in the permit (either new or renewed).

8.2 Final RPA and Effluent Limit Evaluation

The permit writer will use the completed RPA Workbook from **Steps 5** & **6** at the end of year 3 and update the information entered to reflect any additional characterization data[62]. This might result in a change to the previously calculated effluent limits. In this case, the permit writer should revaluate the calculated WQBELs relative to TBELs (if applicable). If there is an effluent limit in the existing permit, then *Anti-Backsliding* requirements normally prevent any changes that would result in a less-conservative limit. Pursuant to the conditions in 40 CFR 122.44 (k)(2)(i), a less stringent limit may be allowed. Please contact the Surface Water Management Section for technical assistance on this topic.

8.3 Documentation

The RPA Workbook has been designed to record all the decisions and calculations made in the course of the analysis from identifying monitoring requirements though effluent limit calculation. The permit writer should include the final RPA Workbook pages in the PER. Additionally, the permit writer should include additional supportive documentation based upon one of the three possible outcomes of RPA in the WQBEL section of the evaluation report: Finally, the RPA Workbook pages from the identification of POC (**Step 3**), the initial RPA (**Step 5**) and initial effluent calculation (**Step 6**) should be included in the administrative record. The three outcomes are:

- **Outcome 1**: Monitoring is not required for toxic pollutants

[62] For example, there might be more detailed information regarding season variation in ambient pollutant concentration that might affect the outcome. At least, an increase number of sample events will reduce the amount of uncertainty in the calculation and result in a less conservative CV and *Multiplier*.

- **Outcome 2**: Monitoring is required for some or all toxic pollutants, and there is not a reasonable potential to exceed water quality criteria for the monitored pollutants
- **Outcome 3**: Monitoring is required for some or all toxic pollutants, and there is a reasonable potential to exceed water quality criteria. Accordingly, effluent limitations are calculated to prevent the exceedance of water quality criteria.

Each of these outcomes and required documentation are discussed in detail in **Sections 8.4** through **8.6**. Additionally, the department has developed a **Fact Sheet Evaluation Matrix** located on the QNET to assist the permit writer in the documentation of the permit development process and provide ready-made permit evaluation report language.

8.4 Outcome 1: Evaluation Report Components for "no monitoring required"

The following applicants will not have to analyze their effluent for toxic pollutant parameters (excluding NH3 and Cl^-) as described in **Section 2** of this document, and thus will have neither, effluent limits nor monitoring requirements in their permit:

- Domestic plants with an average dry weather design flow (ADWDF) of less than 1 MGD , and do not meet any of the following criteria:
  - those with a significant industrial user that discharges into the treatment plant that may be a potential source of pollutants
  - any other conditions that the individual permit writer feels would warrant such level of effort
  - those discharging to water body listed as Category 5 on the 303 d list
  - those "known" to contain **Table 2** or **3** pollutants in source water or effluent
- Non-Primary Industrial facilities that have no "known" pollutants from **Table II**, **III**, **IV** and **V,** and with no identifiable concern for such pollutants.

The components outlined below need to be addressed in the PER to provide the basis of why monitoring for toxic pollutants was not required:

- Attached RPA spreadsheet with the "Monitoring Required" Column completed
- Verification of ADWDF less than 1 MGD for domestics
- Verification of the finding of "no effluent limit monitoring required" as described in process set forth in **Section 2**
- Identification of any State Water Quality Criteria pollutants that are water quality limited for the receiving water body and if a TMDL has been completed for the pollutant
- Description of any potential source of State Water Quality Criteria pollutants in the influent load to the facility, including the results from an industrial waste survey if the facility has performed one
- Verification of the type of treatment technology, and whether the permit writer would expect a greater pass through of toxic pollutants

- Any miscellaneous factors that may warrant a detailed evaluation of potential risk of source to receiving water for toxic pollutants.

8.5 Outcome 2: Evaluation Report Components Where "reasonable potential" is Not Determined

The components outlined below need to be addressed in the evaluation report:

1. The completed RPA spreadsheet with all columns completed
2. Identification of any State Water Quality Criteria pollutants that are water quality limited for the receiving water body and if a TMDL has been completed for the pollutant
3. In addition to the summary statistics presented in the spreadsheets, the permit writer might opt to discuss standard deviation and presence of "non-detects" in effluent and ambient sampling in the narrative summary
4. Rationale or source of information for dilution ratios and background concentrations
5. Rationale or source of information used in an intake credit analysis or in calculating a site-specific background pollutant analysis

8.6 Outcome 3: Evaluation Report Components Where "reasonable potential" is Determined, and "effluent limits" are Calculated

The components outlined below need to be addressed in the evaluation report:

1. The completed RPA and Effluent Limit Calculation spreadsheets with all columns completed
2. Items 2, 3, 4 and 5 from **Outcome 2** (**Section 7.3**), above
3. Rationale for the "probability basis" and the "confidence level" used in the effluent limit calculation.
4. Comparison of the calculated water quality-based effluent to the TMDL/WLA-driven limit, Best Available Technology limit, and existing permit limit, if applicable for specific scenario
5. If applicable, discussion of the use of an intake credit in determining compliance with a WQBEL

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Appendix A: Revision History

Revision	Date	Changes	Editor
1.0	09/2005	Initial Publication	MF
2.0	12/2006	Updated revision	MF & JN
3.0	8/2011	Extensive revisions to reflect changes in environmental regulation, new Departmental policies regarding timing of the permit process, inclusion of new RPA and WQBEL spreadsheets and revision of Quantitation Limit values.	SRB
3.1	2/13/2012	Addition of Intake Credit guidance in App. F, removal of App. C Quantitation Limits to a stand-alone IMD, discussion of recently adopted water quality criteria and implementation options, and numerous minor corrections and clarifications	SRB

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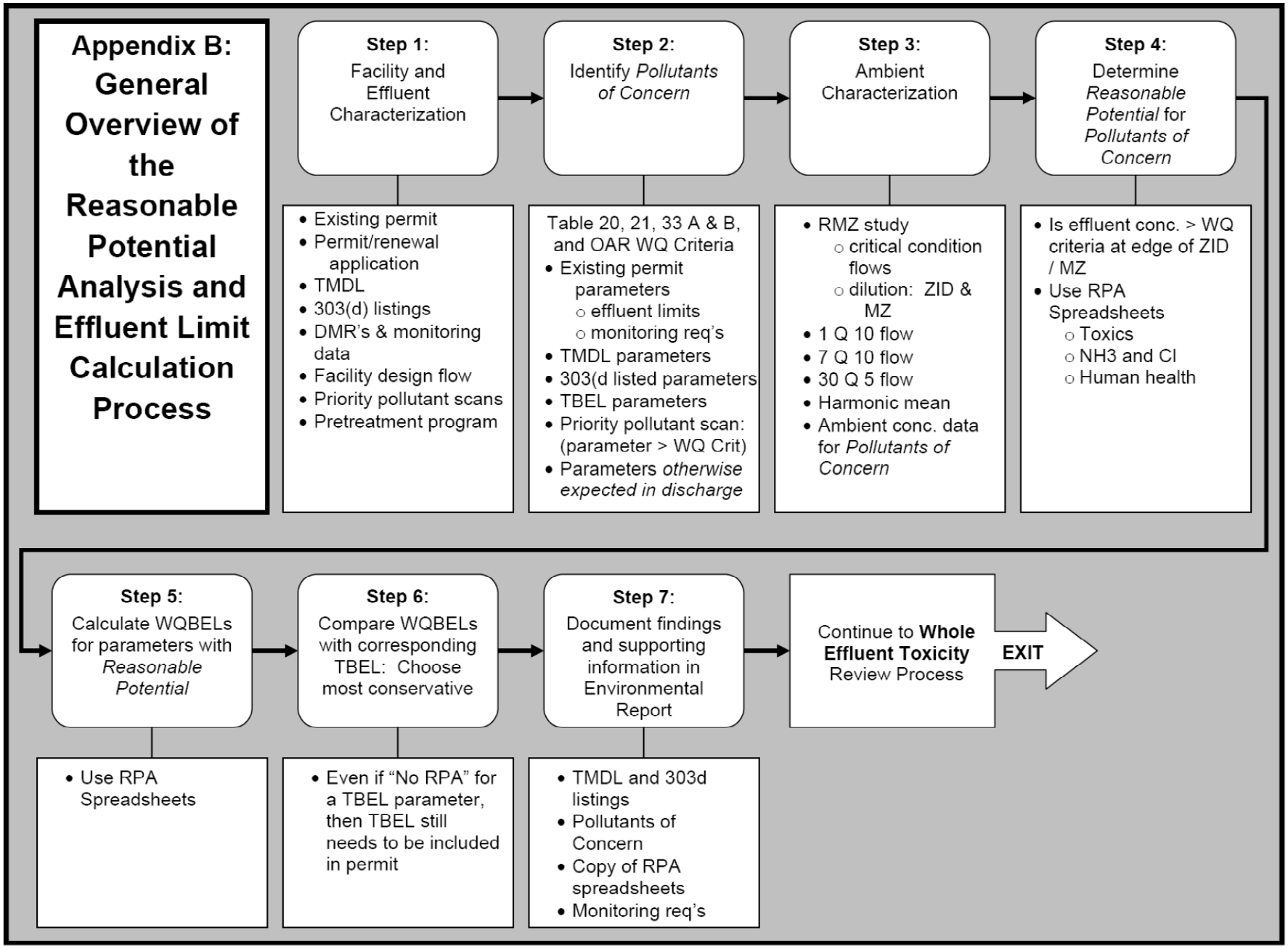
Appendix B: General Overview of the Reasonable Potential Analysis and Effluent Limit Calculation Process
Step 1: Facility and Effluent Characterization
Step 2: Identify Pollutants of Concern
Step 3: Ambient Characterization
Step 4: Determine Reasonable Potential for Pollutants of Concern
• Existing permit
• Permit/renewal application
• TMDL
• 303(d) listings
• DMR's & monitoring data
• Facility design flow
• Priority pollutant scans
• Pretreatment program
Table 20, 21, 33 A & B, and OAR WQ Criteria
• Existing permit parameters
○ effluent limits
○ monitoring req's
• TMDL parameters
• 303(d listed parameters
• TBEL parameters
• Priority pollutant scan: (parameter > WQ Crit)
• Parameters otherwise expected in discharge
• RMZ study
○ critical condition flows
○ dilution: ZID & MZ
• 1 Q 10 flow
• 7 Q 10 flow
• 30 Q 5 flow
• Harmonic mean
• Ambient conc. data for Pollutants of Concern
• Is effluent conc. > WQ criteria at edge of ZID / MZ
• Use RPA Spreadsheets
○ Toxics
○ NH3 and Cl
○ Human health
Step 5: Calculate WQBELs for parameters with Reasonable Potential
Step 6: Compare WQBELs with corresponding TBEL: Choose most conservative
Step 7: Document findings and supporting information in Environmental Report
Continue to Whole Effluent Toxicity Review Process
EXIT
• Use RPA Spreadsheets
• Even if "No RPA" for a TBEL parameter, then TBEL still needs to be included in permit
• TMDL and 303d listings
• Pollutants of Concern
• Copy of RPA spreadsheets
• Monitoring req's

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Appendix C: Analytic Methods, Limits, and Implementation Guidance

Guidance has been moved to own IMD entitled Analytical Methods and Limits for NPDES Permit Development IMD

Note: Human Health Criteria listed here are incorrect. Please refer to most current guidance

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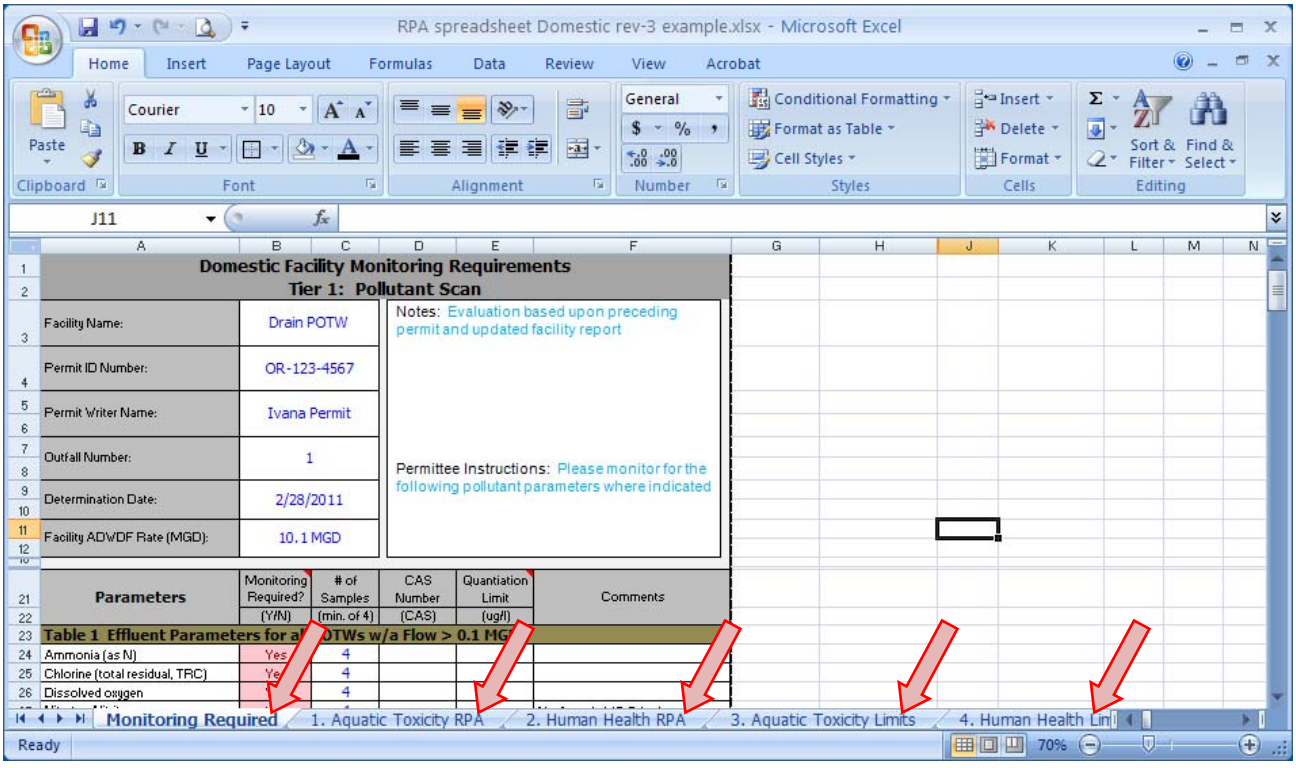
Appendix D: RPA Workbook Walk-though and Example

The following is a walkthrough on how to conduct a Reasonable Potential Analysis (RPA) for toxics using the Department's RPA workbook. Please note that the Steps described here-in are slightly different than the steps discussed in the body of the IMD. Each workbook (Domestic and Industrial) is comprised of the following spreadsheets:

- *Monitoring Required*: Contains all pollutant parameters that the facility might potentially be subject to and is used to record the facility's monitoring requirements for the RPA process
- *Aquatic Toxicity RPA*: Used to identify Pollutants of Concern, model in-stream impacts and determine Reasonable Potential
- *Aquatic Toxicity Limits*: Takes information from *Aquatic Toxicity RPA* spreadsheet along with ambient characterization data to calculate a WQBEL
- *Human Health RPA*: Used to identify Pollutants of Concern, model in-stream impacts and determine Reasonable Potential
- *Human Health Limits*: Takes information from *Human Health RPA* spreadsheet along with ambient characterization data to calculate a WQBEL
- *Misc. Pollutant Parameters*: Spreadsheets used for the RPA and limit calculations for pH, Ammonia, and Chlorine, that are not coved in the RPA IMD.



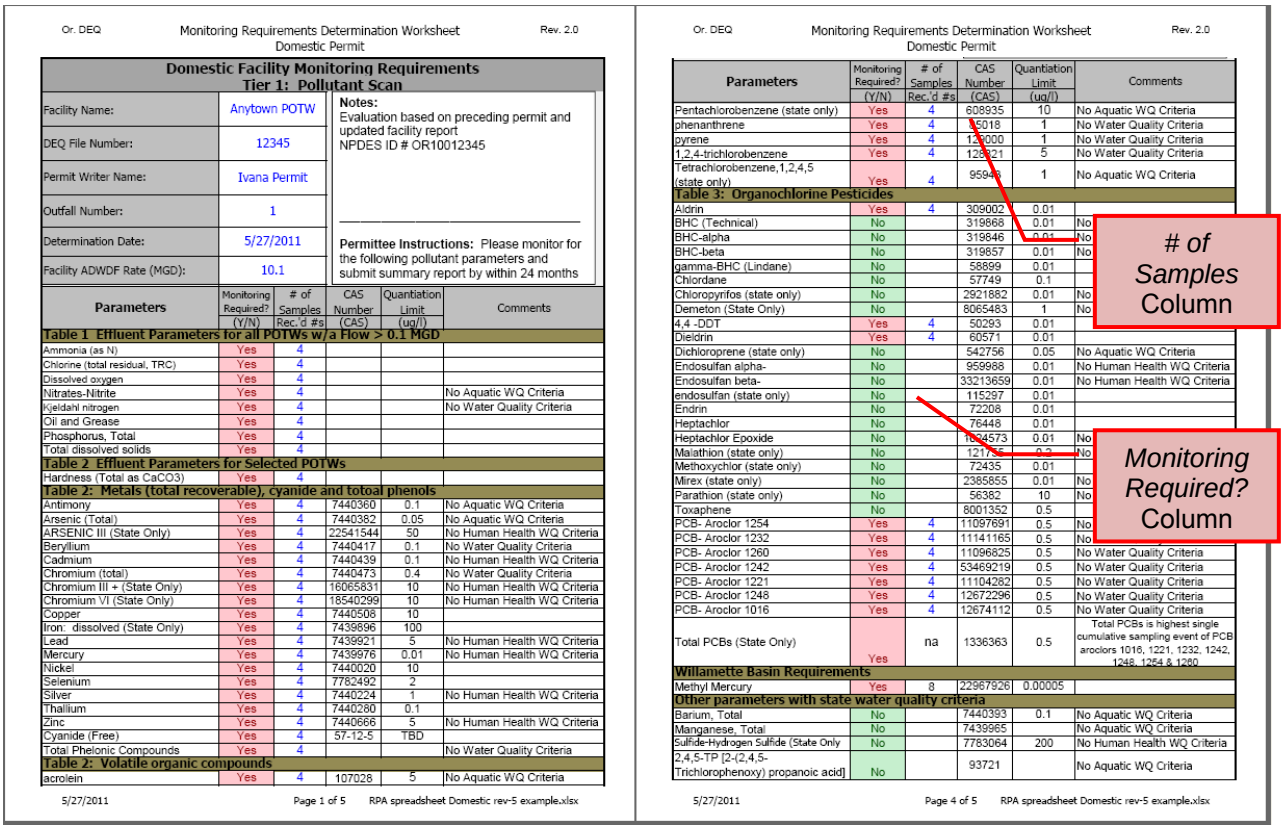
The spreadsheets are linked in order to forward information and calculation results between them. The case study is of a hypothetical Domestic waste water treatment plant (WWTP) that discharges to a freshwater body within the Willamette River Basin listed as water quality limited for 4'4' DDT, Aldrin and Dieldrin. The primary municipal water supply is the same water body approximately 3 miles upstream from the outfall. The average dry weather discharge flow rate is 10.1 MGD. Additionally, PCBs and copper have been identified in the receiving water body, and are presumed to be drawn into the municipal water supply. Of the two, only PCB's have been recorded at concentrations near or greater than water quality criteria. The WWTP currently has an effluent limit for Inorganic Arsenic. A mixing zone analysis has been completed by the facility and the results are included with the permit application.

Step 1: Determining which pollutant parameters require monitoring and analysis

As part of the preceding permit renewal or new permit application process, the permit writer would begin by using the guidance in **Section 2** and the flowchart (**Figure 2-3**) illustrating the domestic monitoring requirements determination process to identify the facility's Tier 1 effluent monitoring requirements. The following pollutant groups or specifically indicated pollutant parameters should be included:

- *Inorganic Arsenic* due to current effluent limits. Compliance monitoring data may be submitted in-lieu of characterization data.
- *PCB's* due to knowledge that the pollutant is present in the significant concentrations in the primary municipal water supply (ie. intake from Willamette River). Since they are in the source water, they are most likely also present in the effluent. The permit writer would need to evaluate the potential for the concentration of the intake pollutants (ie. copper) to determine if it might reach a threshold of significance (near or greater than the water quality criteria).
- *4'4' DDT, Aldrin and Dieldrin* due to the knowledge that the pollutant is present in the significant concentrations in the primary municipal water supply. Even if facility had a separate water supply, these pollutant parameters would still be flagged for monitoring due to the design flow (>1.0 MGD) and the listing status of the receiving waterbody.
- **Table 1 Effluent parameters for all POTWs w/flow ≥ 0.1 MGD**
- **Table 2 Effluent Parameters for Selected POTWs** including *metals*, *volatile organic compounds*, *acid-extractable compounds* and *base-neutral compounds* pollutant groups. This would include *copper*.
- **Table 3 Departmental Pesticides and PCB Monitoring Requirements:** Under this provision, only Aldrin, 4'4' DDT and Dieldrin would require monitoring because of the listing status of the receiving water body.
- *Methyl Mercury* due to **Willamette Basin Requirements.**

The permit writer would record all identified monitoring requirements on the *Monitoring Required* spreadsheet by toggling a "*yes*" or "*no*" in the "*Monitoring Required?*" column. The number of samples required should be recorded in the "*# of Samples*" column. Portions of the completed spreadsheet may be cut and pasted into the **Schedule B** of the permit language (monitoring requirements). A screenshot of the completed Monitoring Required Spreadsheet is presented below:



Or. DEQ — Monitoring Requirements Determination Worksheet — Rev. 2.0
Domestic Permit

Domestic Facility Monitoring Requirements
Tier 1: Pollutant Scan

Facility Name:	Anytown POTW
DEQ File Number:	12345
Permit Writer Name:	Ivana Permit
Outfall Number:	1
Determination Date:	5/27/2011
Facility ADWDF Rate (MGD):	10.1

Notes:
Evaluation based on preceding permit and updated facility report
NPDES ID # OR10012345

Permittee Instructions: Please monitor for the following pollutant parameters and submit summary report by within 24 months

Parameters	Monitoring Required? (Y/N)	# of Samples Rec.'d #s	CAS Number (CAS)	Quantiation Limit (ug/l)	Comments
Table 1 Effluent Parameters for all POTWs w/a Flow > 0.1 MGD					
Ammonia (as N)	Yes	4			
Chlorine (total residual, TRC)	Yes	4			
Dissolved oxygen	Yes	4			
Nitrates-Nitrite	Yes	4			No Aquatic WQ Criteria
Kjeldahl nitrogen	Yes	4			No Water Quality Criteria
Oil and Grease	Yes	4			
Phosphorus, Total	Yes	4			
Total dissolved solids	Yes	4			
Table 2 Effluent Parameters for Selected POTWs					
Hardness (Total as CaCO3)	Yes	4			
Table 2: Metals (total recoverable), cyanide and totoal phenols					
Antimony	Yes	4	7440360	0.1	No Aquatic WQ Criteria
Arsenic (Total)	Yes	4	7440382	0.05	No Aquatic WQ Criteria
ARSENIC III (State Only)	Yes	4	22541544	50	No Human Health WQ Criteria
Beryllium	Yes	4	7440417	0.1	No Water Quality Criteria
Cadmium	Yes	4	7440439	0.1	No Human Health WQ Criteria
Chromium (total)	Yes	4	7440473	0.4	No Water Quality Criteria
Chromium III + (State Only)	Yes	4	16065831	10	No Human Health WQ Criteria
Chromium VI (State Only)	Yes	4	18540299	10	No Human Health WQ Criteria
Copper	Yes	4	7440508	10	
Iron: dissolved (State Only)	Yes	4	7439896	100	
Lead	Yes	4	7439921	5	No Human Health WQ Criteria
Mercury	Yes	4	7439976	0.01	No Human Health WQ Criteria
Nickel	Yes	4	7440020	10	
Selenium	Yes	4	7782492	2	
Silver	Yes	4	7440224	1	No Human Health WQ Criteria
Thallium	Yes	4	7440280	0.1	
Zinc	Yes	4	7440666	5	No Human Health WQ Criteria
Cyanide (Free)	Yes	4	57-12-5	TBD	
Total Phelonic Compounds	Yes	4			No Water Quality Criteria
Table 2: Volatile organic compounds					
acrolein	Yes	4	107028	5	No Aquatic WQ Criteria

5/27/2011 — Page 1 of 5 — RPA spreadsheet Domestic rev-5 example.xlsx

Or. DEQ — Monitoring Requirements Determination Worksheet — Rev. 2.0
Domestic Permit

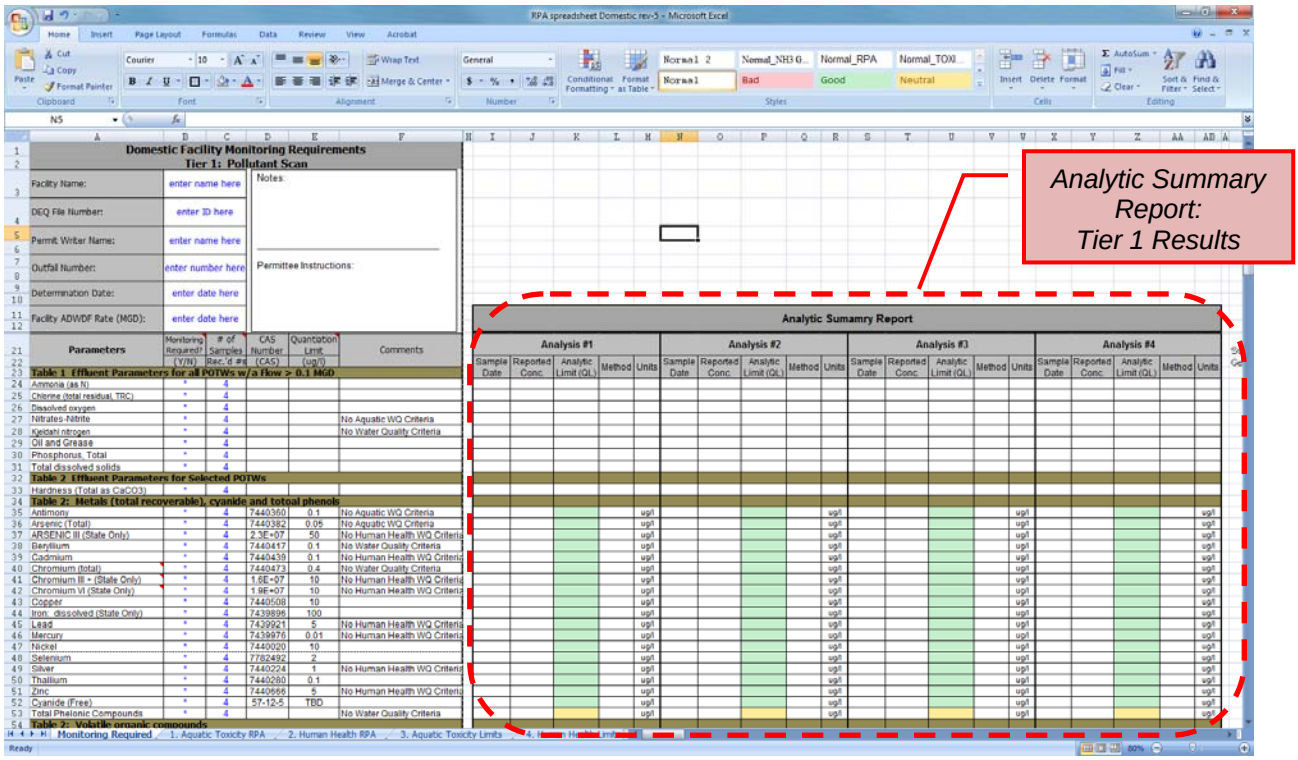
Parameters	Monitoring Required? (Y/N)	# of Samples Rec.'d #s	CAS Number (CAS)	Quantiation Limit (ug/l)	Comments
Pentachlorobenzene (state only)	Yes	4	608935	10	No Aquatic WQ Criteria
phenanthrene	Yes	4	85018	1	No Water Quality Criteria
pyrene	Yes	4	129000	1	No Water Quality Criteria
1,2,4-trichlorobenzene	Yes	4	120821	5	No Water Quality Criteria
Tetrachlorobenzene,1,2,4,5 (state only)	Yes	4	95943	1	No Aquatic WQ Criteria
Table 3: Organochlorine Pesticides					
Aldrin	Yes	4	309002	0.01	
BHC (Technical)	No		319868	0.01	No
BHC-alpha	No		319846	0.01	No
BHC-beta	No		319857	0.01	No
gamma-BHC (Lindane)	No		58899	0.01	
Chlordane	No		57749	0.1	
Chloropyrifos (state only)	No		2921882	0.01	No
Demeton (State Only)	No		8065483	1	No
4,4 -DDT	Yes	4	50293	0.01	
Dieldrin	Yes	4	60571	0.01	
Dichloroprene (state only)	No		542756	0.05	No Aquatic WQ Criteria
Endosulfan alpha-	No		959988	0.01	No Human Health WQ Criteria
Endosulfan beta-	No		33213659	0.01	No Human Health WQ Criteria
endosulfan (state only)	No		115297	0.01	
Endrin	No		72208	0.01	
Heptachlor	No		76448	0.01	
Heptachlor Epoxide	No		1024573	0.01	No
Malathion (state only)	No		121755	0.2	No
Methoxychlor (state only)	No		72435	0.01	
Mirex (state only)	No		2385855	0.01	No
Parathion (state only)	No		56382	10	No
Toxaphene	No		8001352	0.5	
PCB- Aroclor 1254	Yes	4	11097691	0.5	No
PCB- Aroclor 1232	Yes	4	11141165	0.5	No
PCB- Aroclor 1260	Yes	4	11096825	0.5	No Water Quality Criteria
PCB- Aroclor 1242	Yes	4	53469219	0.5	No Water Quality Criteria
PCB- Aroclor 1221	Yes	4	11104282	0.5	No Water Quality Criteria
PCB- Aroclor 1248	Yes	4	12672296	0.5	No Water Quality Criteria
PCB- Aroclor 1016	Yes	4	12674112	0.5	No Water Quality Criteria
Total PCBs (State Only)	Yes	na	1336363	0.5	Total PCBs is highest single cumulative sampling event of PCB aroclors 1016, 1221, 1232, 1242, 1248, 1254 & 1260
Willamette Basin Requirements					
Methyl Mercury	Yes	8	22967926	0.00005	
Other parameters with state water quality criteria					
Barium, Total	No		7440393	0.1	No Aquatic WQ Criteria
Manganese, Total	No		7439965		No Aquatic WQ Criteria
Sulfide-Hydrogen Sulfide (State Only	No		7783064	200	No Human Health WQ Criteria
2,4,5-TP [2-(2,4,5-Trichlorophenoxy) propanoic acid]	No		93721		No Aquatic WQ Criteria

5/27/2011 — Page 4 of 5 — RPA spreadsheet Domestic rev-5 example.xlsx

# of Samples Column

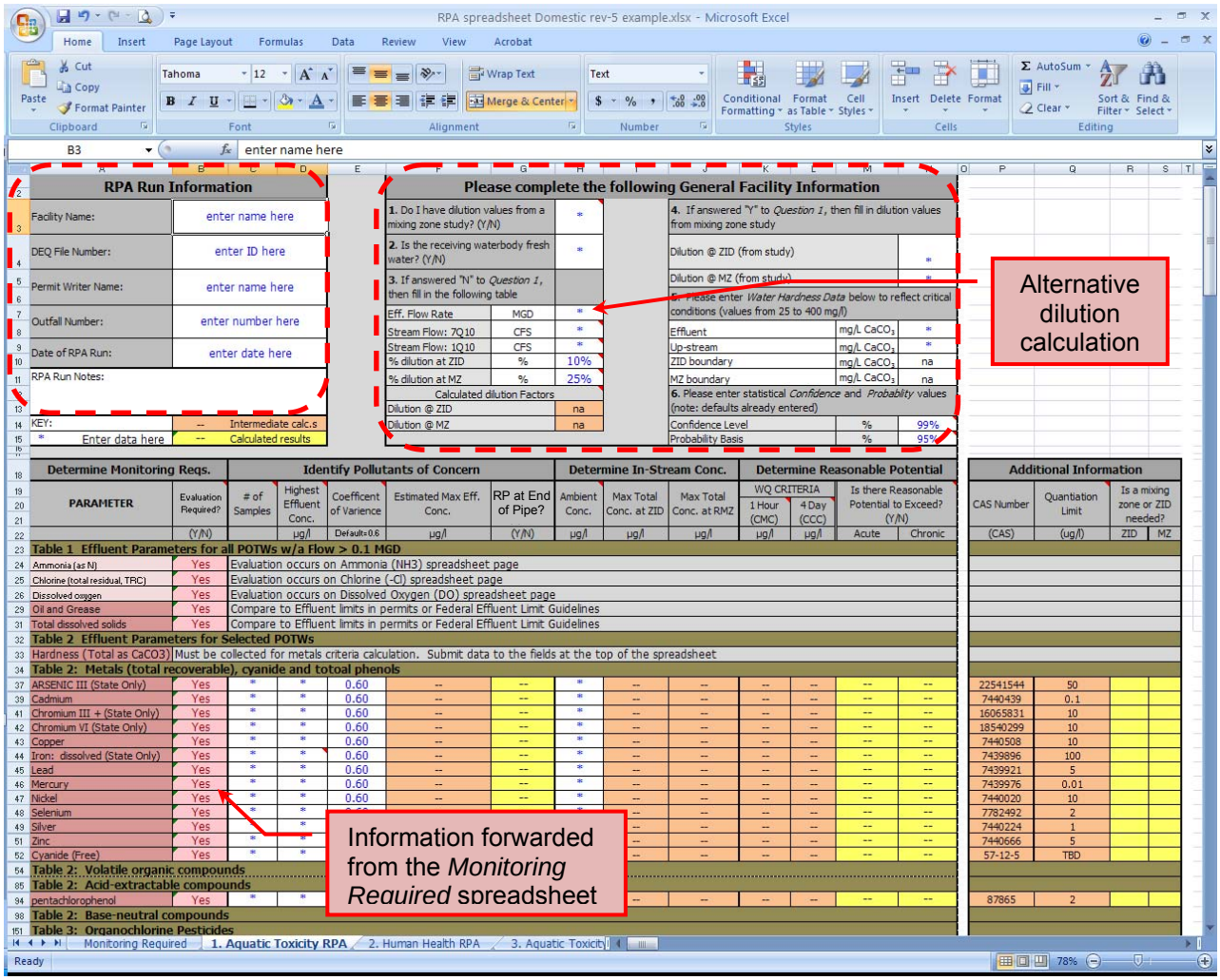
Monitoring Required? Column

Upon issuance, an electronic version of the spreadsheet that includes an Analytic Summary Report template will be provided to the permittee. The permittee will use the template to report the results of their Tier 1 monitoring in both electronic and physical copies. This will allow the permit writer to efficiently review and import analytic data into the RPA Workbook. A screen shot of the monitoring spreadsheet and report template is presented below:



Step 2: General Facility Information

The next step is to fill in the *RPA Run* and *General Facility Information* sections of the *Aquatic Toxicity RPA* spreadsheets. This includes facility identification, effluent characterization, dilution rates (from RMZ analysis), whether the water body is fresh and the hardness of the effluent and receiving water body. If a mixing zone analysis where not available, there is a provision to enter facility and stream flow information instead. The spreadsheet will cross reference the "Monitoring Required?" information from the *Monitoring Required* spreadsheet. The section also has default confidence and probability basis for the calculations. Many of these elements are presented in the illustration below:



The permit writer would conclude the step by repeating the process for the human health criteria using the *Human Health* spreadsheet. It should be noted that the Aquatic Toxicity and Human Health spreadsheets will only have the pollutant parameters listed for which there are state water quality criteria, and can look very different. Additionally, the spreadsheets might potentially have differing mixing zone dilution numbers.

Step 3: Identifying the *Pollutants of Concern in the Effluent*

By the second year (Month 24) of a permit term, the Tier 1 Monitoring data should have been collected and is ready for analysis. For all pollutant parameters that require monitoring and analysis as denoted by a "*Yes*" in the "*Evaluation Required*" column, the permit writer will enter the number of samples and the coefficient of variation into the appropriate columns. For the *Aquatic Toxicity Spreadsheet*, the highest concentration (of effluent) will be entered, but for the *human health* spreadsheet the geometric mean or maximum concentration will be entered depending upon the carcinogen status indicated in the "Carcinogen" Column.

Once entered, the spreadsheet calculates the maximum effluent concentration at the end of pipe and then compares it to the water quality criteria. Pollutants that exceed the water quality criteria are Pollutants of Concern (POC) and are subject to further characterization and RPA analysis. For each POC, a "*Yes*" will be indicated in the "*RP at end of pipe?*" column. In the example below, *cadmium, lead* and *silver* have been identified as a POCs. It should be noted that if there are errors in the calcuation process (as with *mercury*) neither a "yes" or "No" will appear in the column. In this case, a CV value was not entered resulting in the calculation not occuring. Please refer to the screen shot below where the applicable area is magnified.

Table 1 Effluent Parameters for all POTWs w/a Flow > 0.1 MGD						
Ammonia (as N)	Yes	Evaluation occurs on Ammonia (NH3) spreadsheet page				
Chlorine (total residual, TRC)	Yes	Evaluation occurs on Chlorine (-Cl) spreadsheet page				
Dissolved oxygen	Yes	Evaluation occurs on Dissolved Oxygen (DO) spreadsheet page				
Oil and Grease	Yes	Compare to Effluent limits in permits or Federal Effluent Limit (				
Total dissolved solids	Yes	Compare to Effluent limits in permits or Federal Effluent Limit (				
Table 2 Effluent Parameters for Selected POTWs						
Hardness (Total as CaCO3)	Must be collected for metals criteria calculation. Submit data to the fields					
Table 2: Metals (total recoverable), cyanide and totoal phenols						
ARSENIC III (State Only)	Yes	4	1.00	0.60	3.20	No
Cadmium	Yes	4	2.00	0.60	6.40	Yes
Chromium III + (State Only)	Yes	4	0.50	0.60	1.60	No
Chromium VI (State Only)	Yes	4	0.50	0.60	1.60	No
Copper	Yes	4	1.00	0.60	3.20	No
Iron: dissolved (State Only)	Yes	4	1.00	0.60	3.20	No
Lead	Yes	4	0.20	0.60	0.64	Yes
Mercury	Yes	4	0.00	*	--	--
Nickel	Yes	4	1.00	0.60	3.20	No
Selenium	Yes	4	1.00	0.60	3.20	No
Silver	Yes	4	1.00	0.60	3.20	Yes
Zinc	Yes	4	0.50	0.60	1.60	No
Cyanide (Free)	Yes	4	1.00	0.60	3.20	No

Step 4: Sampling Plan

The permit writer would use their knowledge of the facility, receiving water body, potential for the use of an intake credit or site specific background pollutant criterion, and the type of environmental issues suggested by the Tier 1 monitoring to develop the Tier 2 monitoring requirements (ambient data, additional effleunt data, source investigation, etc.). The permit writer would then send the permit applicant a Monitoring Action Letter describing the identified POCs and Tier 2 monitoring requirements, with the direction to develop a Sampling Plan. Typically, the permit writer would advise the permit applicant during the Sampling Plan development to ensure that the necessary data is gathered in the most time and cost efficent manner. The permit applicant would then submit the completed plan to the permit writer for review and approval. Once approved, the plan would be implemented over the course of the following year (Month 24 – 36).

The importance of a developing a robust data set that more accuractly characterizes the pollutant concentration of the effluent is explified in the screen shot below. Here the permit writer has re-evaluated the previosly identified POCs using a more robust data set. The most notable result of this can be seen with *lead* where previously an exceedance at the end of pipe was indidcates, but using 10 data points as opposed to 4, no exceedance was projected.

Determine Monitoring Reqs.		Identify Pollutants of Concern				
PARAMETER	Evaluation Required?	# of Samples	Highest Effluent Conc.	Coefficent of Varience	Estimated Max Eff. Conc.	RP at End of Pipe?
	(Y/N)		µg/l	Default=0.6	µg/l	(Y/N)
Table 1 Effluent Parameters for all POTWs w/a Flow > 0.1 MGD						
Ammonia (as N)	Yes	Evaluation occurs on Ammonia (NH3) spreadsheet page				
Chlorine (total residual, TRC)	Yes	Evaluation occurs on Chlorine (-Cl) spreadsheet page				
Dissolved oxygen	Yes	Evaluation occurs on Dissolved Oxygen (DO) spreadsheet pag				
Oil and Grease	Yes	Compare to Effluent limits in permits or Federal Effluent Limit				
Total dissolved solids	Yes	Compare to Effluent limits in permits or Federal Effluent Limit				
Table 2 Effluent Parameters for Selected POTWs						
Hardness (Total as CaCO3)	Must be collected for metals criteria calculation. Submit data to the field					
Table 2: Metals (total recoverable), cyanide and totoal phenols						
ARSENIC III (State Only)	Yes	4	1.00	0.60	3.20	**No**
Cadmium	Yes	4	2.00	0.60	6.40	**Yes**
Chromium III + (State Only)	Yes	4	0.50	0.60	1.60	**No**
Chromium VI (State Only)	Yes	4	0.50	0.60	1.60	**No**
Copper	Yes	4	1.00	0.60	3.20	**No**
Iron: dissolved (State Only)	Yes	4	1.00	0.60	3.20	**No**
Lead	Yes	10	0.20	0.60	0.42	**No**
Mercury	Yes	4	0.00	0.60	0.00	**No**
Nickel	Yes	4	1.00	0.60	3.20	**No**
Selenium	Yes	4	1.00	0.60	3.20	**No**
Silver	Yes	4	1.00	0.60	3.20	**Yes**
Zinc	Yes	4	0.50	0.60	1.60	**No**
Cyanide (Free)	Yes	4	1.00	0.60	3.20	**No**

Step 5: Determining In-stream Concentration After Mixing / Determining RP

Further analysis will be required for only those POCs identified as exceeding water quality criteria at the end of pipe. Accordingly the Sampling Plan and Tier 2 monitoring was designed to collected ambient data for the POCs, and where necessary develop a more robust data set. Once the TIER 2 monitoring data has been received, the permit writer should update the "*Identify Pollutants of Concern*" section of the spreadsheet with the more robust data sets. As seen in the previous example, this resulted in a pollutant parameter (*lead)* as being determined that there was not potential to exceed water quality criteria at the point of discharge, and no further analysis is required.

For the **Aquatic Toxicity Spreadsheet**, the permit writer will enter the maximum or 90th percentile ambient concentration (depending on the number of data points) in to the column entitled "*Ambient Concentration*". For the *Human Health* spreadsheet the geometric mean of the ambient data will be entered. The spreadsheet will then calculate the in-stream concentrations at the boundaries of the various mixing zones.

The spreadsheet then compares the projected in-stream concentrations to the water quality criteria. If the criteria are exceeded, then a "*Yes*" will appear in the appropriate portion of the "*Is there Reasonable Potential to Exceed?*" column. Please note how reasonable potential is determined for both acute and chronic conditions.

If the necessary data is available, the permit writer may conduct an intake credit analysis and determine if RP is still present.

Determine Monitoring Reqs.		Identify Pollutants of Concern					Determine In-Stream Conc.			Determine Reasonable Potential			
PARAMETER	Evaluation Required?	# of Samples	Highest Effluent Conc.	Coefficent of Varience	Estimated Max Eff. Conc.	RP at End of Pipe?	Ambient Conc.	Max Total Conc. at ZID	Max Total Conc. at RMZ	WQ CRITERIA 1 Hour (CMC)	WQ CRITERIA 4 Day (CCC)	Is there Reasonable Potential to Exceed? (Y/N)	
	(Y/N)		µg/l	Default=0.6	µg/l	(Y/N)	µg/l	µg/l	µg/l	µg/l	µg/l	Acute	Chronic
Table 1 Effluent Parameters for all POTWs w/a Flow > 0.1 MGD													
Ammonia (as N)	Yes	Evaluation occurs on Ammonia (NH3) spreadsheet page											
Chlorine (total residual, TRC)	Yes	Evaluation occurs on Chlorine (-Cl) spreadsheet page											
Dissolved oxygen	Yes	Evaluation occurs on Dissolved Oxygen (DO) spreadsheet page											
Oil and Grease	Yes	Compare to Effluent limits in permits or Federal Effluent Limit Guidelines											
Total dissolved solids	Yes	Compare to Effluent limits in permits or Federal Effluent Limit Guidelines											
Table 2 Effluent Parameters for Selected POTWs													
Hardness (Total as CaCO3	Must be collected for metals criteria calculation. Submit data to the fields at the top of the spreadsheet												
Table 2: Metals (total recoverable), cyanide and totoal phenols													
ARSENIC III (State Only)	Yes	4	1.00	0.60	3.20	No	*	--	--	260.0	190.0	--	--
Cadmium	Yes	10	2.00	0.60	4.20	Yes	2.00	2.22	2.02	0.8	0.4	YES	YES
Chromium III + (State Only)	Yes	4	0.50	0.60	1.60	No	*	--	--	563.4	66.6	--	--
Chromium VI (State Only)	Yes	4	0.50	0.60	1.60	No	*	--	--	16.0	11.0	--	--
Copper	Yes	4	1.00	0.60	3.20	No	*	--	--	4.9	3.6	--	--
Iron: dissolved (State Only	Yes	4	1.00	0.60	3.20	No	*	--	--	na	1000.0	--	--
Lead	Yes	10	0.20	0.60	0.42	No	*	--	--	14.2	0.5	--	--
Mercury	Yes	4	0.00	0.60	0.00	No	*	--	--	2.4	0.0	--	--
Nickel	Yes	4	1.00	0.60	3.20	No	*	--	--	443.4	48.8	--	--
Selenium	Yes	4	1.00	0.60	3.20	No	*	--	--	260.0	35.0	--	--
Silver	Yes	10	1.00	0.60	2.10	Yes	1.00	1.11	1.01	0.4	0.1	YES	YES
Zinc	Yes	4	0.50	0.60	1.60	No	*	--	--	36.5	32.8	--	--
Cyanide (Free)	Yes	4	1.00	0.60	3.20	No	*	--	--	22.0	5.2	--	--

Step 6: Calculation of Effluent Limits

For all pollutant parameters where reasonable potential is determined, the information will automatically be transferred to the *Aquatic Toxicity* or *Human Health* effluent limit calculation spreadsheets. The permit writer need only insert the anticipated amount of monthly monitoring for the pollutant parameter. This number is important since it affects the how conservative the final calculated effluent will be. Both the Monthly Average and Maximum Daily effluent limits will be calculated in the final, "*Effluent Limit*" columns of the spreadsheets.

In some instances, the permit writer might consider varying the *Confidence Intervals* to affect the effluent limit calculation outcome. For any changes from the default settings in the spreadsheet, the permit writer should document the basis behind the changes in the Permit Evaluation Report (PER).

Or. DEQ

Water Quality Based Effluent Limit Calculation - Aquatic Toxicity - Domestic Facility

Rev. 2.0

RPA Run Information	
Facility Name:	enter name here
DEQ File Number:	enter ID here
Permit Writer Name:	enter name here
Outfall Number:	enter number here
Date of RPA Run:	enter date here
RPA Run Notes:	

General Facility Information		
1. Do I have dilution values from a mixing zone study? (Y/N)		y
2. Is the receiving waterbody fresh water? (Y/N)		y
3. If answered "N" to *Question 1*, then fill in the following table		
Eff. Flow Rate	MGD	*
7Q10	CFS	*
1Q10	CFS	*
% dilution at ZID	%	10%
% dilution at MZ	%	25%
Calculated dilution factors		
Dilution @ ZID		na
Dilution @ MZ		na

4. If answered "Y" to *Question 1*, then fill in dilution values from mixing zone study	
Dilution @ ZID (from study)	10
Dilution @ MZ (from study)	100

5. Hardness Data, Taken from *Aquatic Toxicity RPA* page		
Effluent	mg/L $CaCO_3$	28
Up-stream	mg/L $CaCO_4$	25
ZID boundary	mg/L $CaCO_5$	25
MZ boundary	mg/L $CaCO_6$	25

6. Probablity basis for WLA multipliers	
Probability Basis	99%
Confidence Level: Monthly	95%
Confidence Level: Max Daily	99%

PARAMETER	Analysis req? (is there RPA?)		WQ Criteria		Ambient Conc.	Waste Load Allocations		CV	Monitoring req.	Acute LTA	Chronic LTA	Min. LTA	Effluent Limits	
	Acute	Chronic	1 Hour (CMC)	4 Day (CCC)		Acute	Chronic						95% Monthly (AML)	99% Max Daily (MDL)
	(Y/N)	(Y/N)	µg/l	µg/l	µg/l	µg/l	µg/l		#/month	µg/l	µg/l	µg/l	µg/l	µg/l
Table 1 Effluent Parameters for all POTWs w/a Flow > 0.1 MGD														
Table 2 Effluent Parameters for Selected POTWs														
Table 2: Metals (total recoverable), cyanide and totoal phenols														
Arsenic III (State Only)	--	--	--	--	--	--	--	--	*	--	--	--	--	--
Cadmium	YES	YES	0.8322	0.3823	2	1	0	0.6	4	0	0	0	0.31	0.63
Chromium III + (State Only)	--	--	--	--	--	--	--	--	*	--	--	--	--	--
Chromium VI (State Only)	--	--	--	--	--	--	--	--	*	--	--	--	--	--
Copper	--	--	--	--	--	--	--	--	*	--	--	--	--	--
Iron: dissolved (State Only)	--	--	--	--	--	--	--	--	*	--	--	--	--	--
Lead	--	--	--	--	--	--	--	--	*	--	--	--	--	--
Mercury	--	--	--	--	--	--	--	--	*	--	--	--	--	--
Nickel	--	--	--	--	--	--	--	--	*	--	--	--	--	--
Selenium	--	--	--	--	--	--	--	--	*	--	--	--	--	--
Silver	YES	YES	0.3817	0.12	1	0	0	0.6	4	0	0	0	0.10	0.20
Thallium	--	--	--	--	--	--	--	--	*	--	--	--	--	--
Zinc	--	--	--	--	--	--	--	--	*	--	--	--	--	--
Cyanide (Free)	--	--	--	--	--	--	--	--	*	--	--	--	--	--
Table 2: Volatile organic compounds														
Table 2: Acid-extractable compounds														
pentachlorophenol	--	--	--	--	--	--	--	--	*	--	--	--	--	--
Table 2: Base-neutral compounds														
Table 3: Organochlorine Pesticides														
Aldrin	--	--	--	--	--	--	--	--	*	--	--	--	--	--
gamma-BHC (Lindane)	--	--	--	--	--	--	--	--	*	--	--	--	--	--

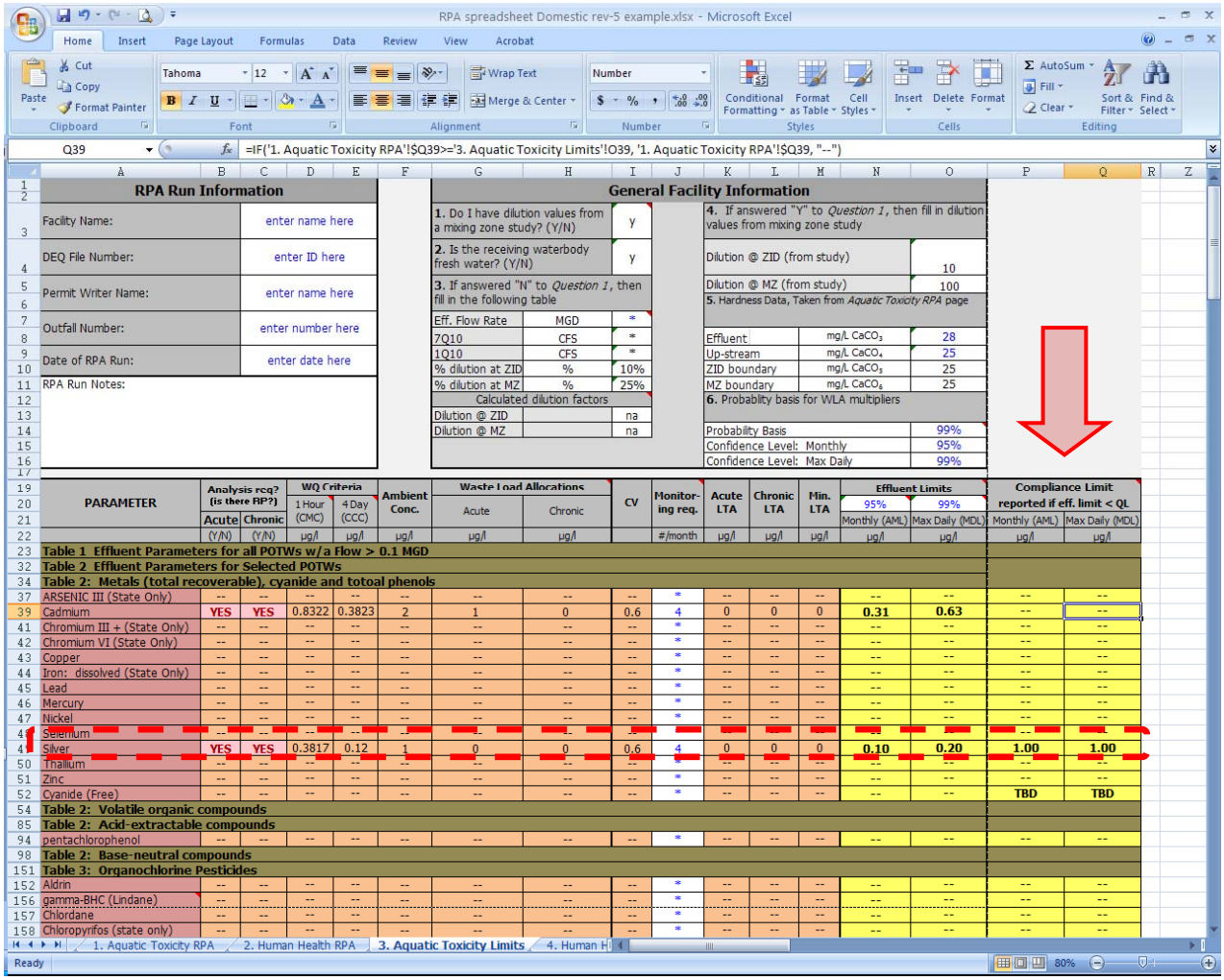
5/27/2011 Page 1 of 2 RPA spreadsheet Domestic rev-5 example.xlsx

The analysis indicated that there was reasonable potential for *cadmium* and *silver* resulting in water quality based effluent limits (WQBELs). Once the permit writer has completed the human health portion of the analysis, any resulting limits would be compared and the most conservative (for each pollutant parameter) selected. The selected WQBELS would then be compared to any applicable TBELS, and the most conservative placed into the permit. Since this case study is of a domestic WWTP there would be no TBELS. If allowed, the permit writer might opt to use the intake concentration of the source water when determining compliance with the selected WQBEL. Copies of the RPA and limit calculation spreadsheets should be included in the PER.

Step 7: Quantitation Limits and Compliance Levels

An additional feature of the **RPA Workbook** is a field that compares calculated effluent limits to the Department's Quantitation Limits. In cases where an effluent limit is below the analytic range of available methods the Quantitation Limit becomes the default compliance level. In this example, for silver a compliance level of 1.00 ug/l would be used in-lieu of the calculated WQBEL of 0.10 ug/l.

This field can be seen on the electronic spreadsheet, although it is hidden on printed report. An example is presented in the screen shot below:



Appendix E: Whole Effluent Toxicity Guidance

The Department's Whole Effluent Toxicity (WET) guidance was not updated as part of this RPA IMD revision. Permit writer should refer to the guidance and example permit language presented on the *WET Section* of the Permit Writer's Corner located on the QNET.

For additional information or technical assistance, please contact the WET Coordinator located at the DEQ Laboratory (Lori Pillsbury (503) 693-5735).

The following language has been taken (unchanged) from the September, 2005 revision of the RPA IMD. Permit Writers may refer to this guidance, although they should their discretion and defer to the updated guidance from the Permit Writer's Corner or from the WET Coordinator when appropriate.

7.1 Background

What is "Whole Effluent Toxicity" testing?

"Whole Effluent Toxicity" (WET) testing measures whether an effluent in its entirety (with its mixture of various chemicals) causes toxicity in aquatic organisms. WET testing is usually conducted in controlled laboratory experiments in which aquatic organisms are exposed to samples of effluent at different dilutions.

Why is it required?

WET testing addresses the OAR 340-041-0033(1) requirement to prevent the discharge of toxic substances into Oregon's waters above natural background levels in amounts that are toxic to aquatic life. Although DEQ has adopted numeric water quality criteria in Tables 20, 33A, and 33B for the protection of aquatic life for a number of chemicals that might be found in wastewater discharges, other chemicals do not have criteria because information on toxicity is limited and the data requirements for deriving criteria are rigorous. In addition, the numeric water quality criteria are derived for individual chemicals, whereas some wastewater discharges contain mixtures of chemicals that might have synergistic toxic effects even though the amount of any individual chemical in the mixture is below toxicity levels. WET testing results are used to address these information gaps and ensure that discharges are not toxic.

Acute toxicity

What is it?

OAR 340-041-0053(2)(a)(A) defines acute toxicity as lethality to aquatic life as measured by a significant difference in lethal concentration between the control and 100 percent effluent in an acute bioassay test

What is the performance standard (rule requirement)?

OAR 340-041-0053(2)(a)(A) prohibits acutely toxic discharges; however, lethality in 100% effluent may be allowed if there is a mixing zone with immediate dilution of the effluent ("zone of immediate dilution" or "ZID").

How is compliance with the standard determined?

In permits where a mixing zone is allowed (e.g. discharge to a river with a large flow) and a ZID exists, acute toxicity would be indicated when a statistically significant difference in survival between the tested dilutions and the control occurs at dilutions greater than that found at the edge of the ZID. If there is no ZID, acute toxicity would be indicated when a statistically significant difference in survival occurs between 100% effluent and the control.

To comply with the rule definition of acute toxicity, "hypothesis testing" must be conducted to evaluate acute toxicity. This means that there should be no statistical difference between the WET test results from the effluent sample and control groups at a significance level of $\alpha=0.05$. Often, the laboratory conducting the bioassays will test a series of dilutions of effluent (e.g. 100%,

50%, 25%, 12% and 6% effluent) to determine the No-Observable-Effect-Concentration (NOEC) of the effluent in order to meet the requirement for no statistical difference between effluent (at some dilution) groups and control groups. For more information on evaluation WET test results, see the EPA methods documents cited in the Test Methods section below.

Chronic toxicity

What is it?

OAR 340-041-0053(2)(b)(A) characterizes measurement of chronic toxicity as the concentration that causes long-term sublethal effects, such as significantly impaired growth or reproduction in aquatic organisms, during a testing period based on the test species life cycle.

What is the performance standard (rule requirement)?

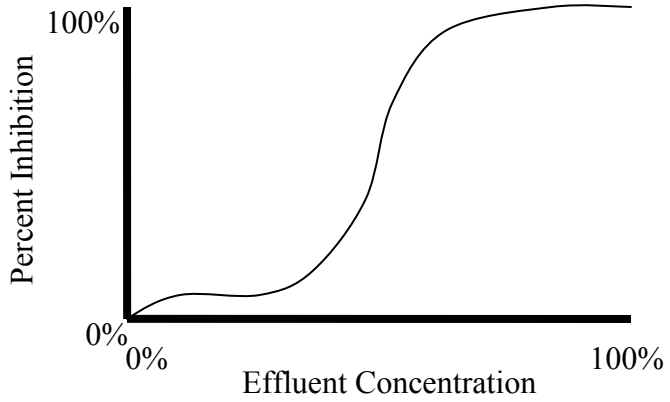
OAR 340-041-0053(2)(b)(A) does not allow chronic toxicity outside of a mixing zone.

How is compliance with the standard determined?

In permits with a mixing zone, chronic toxicity is assessed by examining the effect of effluent at various doses on organisms in bioassays, making sure that the doses of effluent tested bracket the concentration at the edge of the mixing zone. If no mixing zone exists, chronic toxicity would still be assessed using a series of effluent doses (including 100%); however, the point of compliance would be at end of pipe.

To determine statistical significance in chronic toxicity testing, the Department uses EPA's *Technical Support Document for Water Quality-based Toxics Control, March 1991* (TSD), which recommends that the concentration of effluent that results in 25% inhibition of the parameter used to determine a chronic effect (e.g. growth) be the benchmark for determining whether the results of chronic tests indicate toxicity. (This 25% inhibition concentration is also referred to as the IC_{25}.) For example, when testing a series of dilutions of effluent on the growth of fathead minnows, a dilution yielding 12% inhibition of growth will not be considered as a significant chronic effect, but 25% inhibition of growth would be significant.

The IC_{25} is based on a point estimate technique, which assumes a continuous dose-response relationship (often represented by a sigmoid curve describing the relation between amount of inhibition or effect and the dose of compound or mixture).



Since the relationship is continuous, a choice must be made as to some level of effect that will be considered "safe" and statistically significant. According to EPA (TSD), "point estimation techniques are the preferred statistical methods in calculating endpoints for effluent toxicity tests" for chronic toxicity. This is due to the inability to estimate test precision when using hypothesis testing for deriving a No Observed Effect Concentration (NOEC), thus making the inherent variability of bioassay results difficult to address statistically. EPA compared data from the point estimate and NOEC approaches and concluded that the "IC25 is approximately the analogue of an NOEC derived using hypothesis testing."

For more information on evaluation WET test results, see the EPA methods documents cited in the Test Methods section below.

Test methods

EPA has published methods for conducting and evaluating WET testing (the latest are listed below).

- "Methods for measuring the acute toxicity of effluents and receiving waters to freshwater and marine organisms" (Fifth Edition, October 2002) (EPA 821-R-02-012; http://www.epa.gov/OST/WET/).
- "Short-term methods for estimating the chronic toxicity of effluents and receiving waters to freshwater organisms" (Fourth Edition, October 2002) (EPA 821-R-02-013).
- "Short-term methods for estimating the chronic toxicity of effluents and receiving waters to marine and estuarine organisms" (Third Edition, October 2002) (EPA 821-R-02-014)

and such methods should be used for meeting WET testing requirements.

- "Short-term methods for estimating the chronic toxicity of effluents and receiving waters to west coast marine and estuarine organisms" (August 1995) (EPA/600/R-95/136)

Use Table 6 below to determine whether to use a freshwater or saltwater method.

Table 6. Choosing Freshwater or Saltwater Method

IF Receiving Stream is	AND Intake or Influent is	THEN Species for WET Test is
Freshwater[1]	Freshwater	Freshwater
	Saltwater	Freshwater
Saltwater[2]	Freshwater	Freshwater for acute test Saltwater for chronic test
	Saltwater	Saltwater

[1] Freshwater is water in which the salinity is equal to or less than 1 part per thousand 95% or more of the time.
[2] Saltwater is water in which the salinity is equal to or greater than 10 parts per thousand 95% or more of the time.
Note: Water between 1 and 10 parts per thousand salinity should be considered of mixed salinity and WET determined for both fresh and salt water.

Test species

Acute toxicity testing requires exposure of multiple species (which at a minimum will include a fish and an invertebrate to effluent for 48 (for an invertebrate) or 96 hours (for a fish). Chronic toxicity testing also requires exposure of multiple species (which at a minimum will include a fish, an invertebrate, and a plant) to effluent for various durations depending on the experimental endpoint specified in the methods. The species appropriate for acute and chronic testing are listed in Table 7.

Table 7. WET Test Species

FRESHWATER		
IF appropriate WET Test is	**AND Species Type required is**	**THEN Species for WET test should include one of the following per Species Type**
Acute	invertebrate	*Ceriodaphnia dubia* (daphnid) *Daphnia pulex* and *D. magna* (daphnids)
	fish	*Pimephales promelas* (fathead minnow) *Oncorhynchus mykiss* (rainbow trout)
Chronic	invertebrate	*Ceriodaphnia dubia* (daphnid)
	fish	*Pimephales promelas* (fathead minnow)
	plant	*Raphidocelis subcapitata* (green alga also known as *Selanastrum capricornutum*)
ESTUARINE & MARINE		
IF appropriate WET Test is	**AND Species Type required is**	**THEN Species for WET test should include one of the following per Species Type**
Acute	invertebrate	*Mysidopsis bahia* (mysid shrimp) *Holmesimysis costata* (mysid shrimp), specific to Pacific Coast waters
	fish	*Cyprinodon varieganus* (sheepshead minnow) *Menida beryllina* (inland silverside) *M. menidia* (Atlantic silverside) *M peninsulae* (tidewater silverside)
Chronic	invertebrate	*Mysidopsis bahia* (mysid shrimp) *Arbacia punctulata* (sea urchin) *Haliotis rufescens* (red abalone), specific to Pacific Coast waters *Crassostrea gigas* (Pacific oyster), specific to Pacific Coast waters *Mytilus spp*. (mussel), specific to Pacific Coast waters *Holmesimysis costata* (mysid shrimp), specific to Pacific Coast waters *Strongylocentrotus purpuratus* (sea urchin), specific to Pacific Coast waters *Dendraster excentricus* (sand dollar), specific to Pacific Coast waters
	fish	*Cyprinodon variegatus* (sheepshead minnow) *Menidia beryllina* (inland silverside) *Atherinops affinis* (topsmelt), specific to Pacific Coast waters
	plant	*Champia parvula* (red macroalga) *Macrocystis pyrifera* (giant kelp), specific to Pacific Coast waters

Species used Several of the species listed in the above table can be used for both acute and

for both acute and chronic toxicity testing

chronic toxicity testing using what is called a "dual endpoint" laboratory test. Dual endpoint test are those in which the protocols for chronic toxicity testing are carried out with additional information collected on survival at 48 and 96 hours to check for acute toxicity. These tests are desirable because analytical costs are lower and the permit writer may allow the submission of dual endpoint test results in lieu of individual acute and chronic test results.

For freshwater, these include:

- *Ceriodaphnia dubia* (water flea), and
- *Pimephales promelas* (fathead minnow).

In this example, the acute test endpoints would be survival at 48 hours for water flea and at 96 hours for fathead minnow and the chronic endpoints would be survival and reproduction after 8 days for water flea and body weight after 7 days for fathead minnow.

When both intake and receiving stream are saltwater, species with dual endpoints include:

- *Cyprinodon variegatus* (sheepshead minnow)
- *Menida beryllina* (inland silverside)
- *Holmesimysis costata* (mysid shrimp)
- *Mysidopsis bahia* (mysid shrimp)

7.2 WET Review in the Permitting Process

Where WET review fits in the permit process

Once an application for a discharge permit has been subjected to reasonable potential analysis for the pollutants listed in Tables 20, 33A, and 33B of OAR 340-041 (see previous chapters), then the analysis turns to determining whether there is reasonable potential for the discharge to cause toxicity due to chemicals or combinations in the effluent that have not been addressed in the tables listed above.

What does the permit writer need to do?

The permit writer must:

1. Conduct a WET review as part of the application review process.
2. If necessary, include appropriate WET requirements in Schedule D Special Conditions of the NPDES permit.
3. Document decision making process.

Overview of WET review process

The WET review process consists of two major steps:

1. Determining if the discharge has a risk of causing aquatic toxicity. (Figure 5)
2. If there is a risk, determining if WET testing is required in the permit. (Figure 6)

Figures 5 and 6 provide summaries of these processes in flow charts, expressing each process as a series of yes and no questions and findings. In some instances, information for answering the questions can be taken directly from the application materials; in others, answers result from analyzing information from other sources (e.g. federal regulations specifying which chemicals are considered toxic to aquatic life). A more complete explanation of the steps within each flowchart is given in Section 7.3 for Figure 5 and Section 7.4 for Figure 6.

Compliance with WET requirements

If WET requirements are included in the permit in Schedule D, compliance with these requirements must be evaluated. Section 7.6 and Figure 7 describe the necessary steps staff must take to perform this evaluation. At this time, the Department recommends this Special Conditions approach rather than numeric limits; however, if WET requirements are included in the permit as numeric limits, then the permit writer should consult the TSD for possible approaches.

7.3 Step A: Determining if there is a risk of aquatic toxicity

Is there a risk of aquatic toxicity (Figure 5)?

A risk of aquatic toxicity in the discharge exists if the facility meets at least one of the following conditions (see Figure 5 for the decision flow chart):

1. The facility uses, stores, produces as a product or waste, or transfers any hazardous substance listed in 40 CFR §302.4 with a statutory code of 1 or 2 [referring to Sections 311 (b)(4) or 307(a) of the Clean Water Act] unless permittee demonstrates to DEQ's satisfaction that there is no possibility of these items being discharged. Appendix F contains a list of these substances based on the July 2005 electronic code of federal regulations (http://ecfr.pgoaccess.gov, select "Title 40 – Protection of Environment" and then navigate to 40 CFR 302.4). (Figure 5, Step 1)
2. The facility's discharge contains any toxic pollutant listed in Appendix D of 40 CFR Part 122 for which there are no water quality criteria for aquatic life protection listed in 40 CFR 131.36(b)(1). Appendix G contains a list of these substances. (Figure 5, Step 2)
3. The facility belongs to an industry category identified in 40 CFR Part 122, Appendix A (NPDES Primary Industry categories), listed in the Table 8. (Figure 5, Step 3)
4. The facility is a municipal sewage collection and treatment system with a flow equal to or greater than 1 million gallons per day (MGD). (Figure 5, Step 4)
5. The facility is a municipal sewage collection and treatment system that receives a discharge from any industry category identified in 40 CFR Part 403, Appendix C (currently not specified). (Figure 5, Step 5)
6. The facility exceeded the acute or chronic whole effluent toxicity performance standard within the last five years (unless that facility already has whole effluent toxicity limits or the Department has made a finding that such limits should be removed because of attainment of WET performance standard). (Figure 5, Step 6)
7. The facility's discharge is suspected to be toxic because of apparent damage to aquatic life in the receiving water. (Figure 5, Step 7)
8. The Department determines that the facility has potential to discharge toxics (including those chemicals listed in Table 33C Water Quality Guidance Values in OAR 340-041) in toxic amounts. (Figure 5, Step 8)

What's next?

If the discharge from the facility does not meet any of the above conditions, then there is no risk of aquatic toxicity and there are no WET requirements for the permit. If it does, the permit writer must determine if WET requirements are needed in the permit (see Section 7.3 and Figure 6).

Figure 5. WET Testing: Is there a Risk of Aquatic Toxicity.

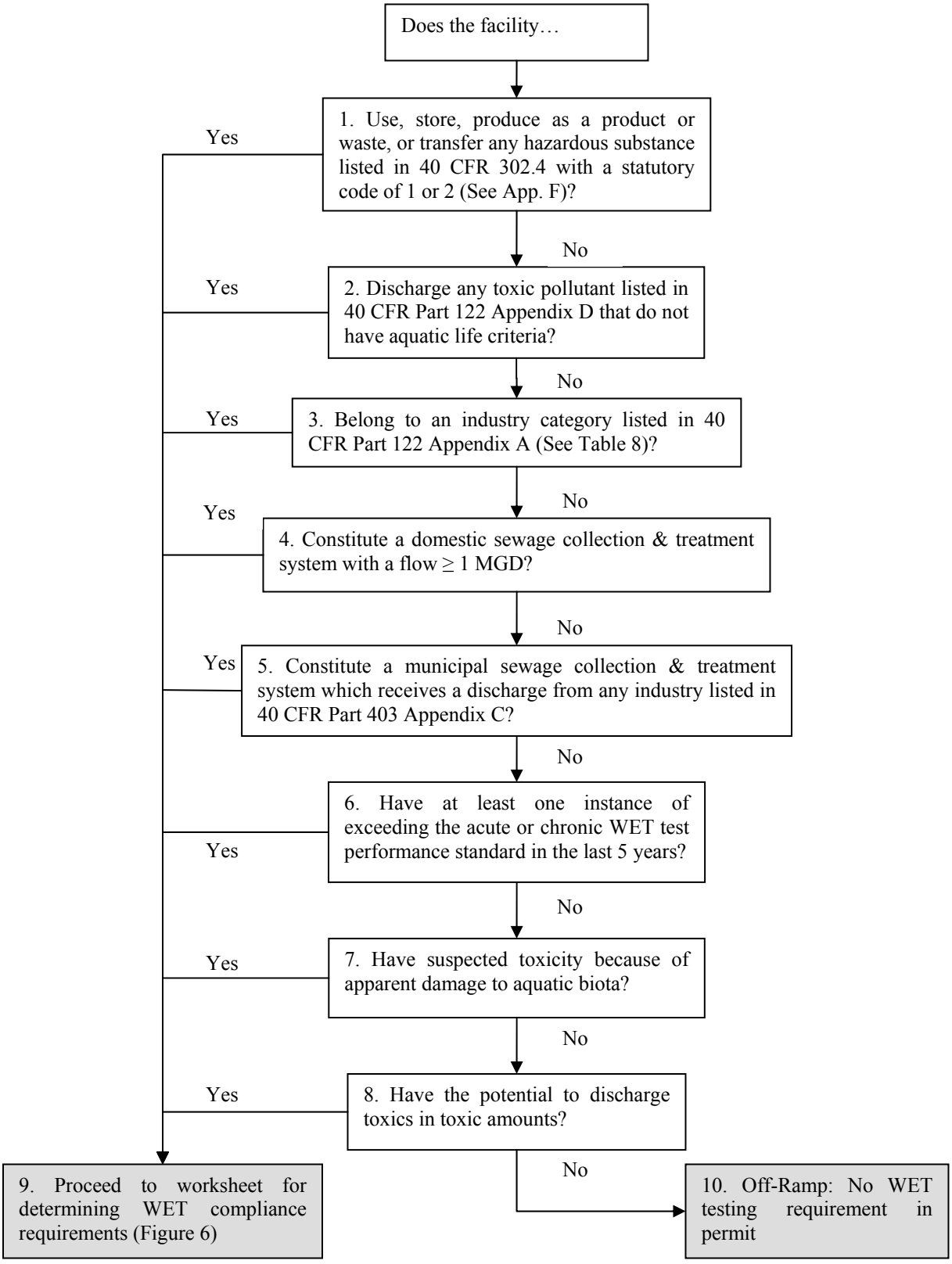


Table 8. NPDES Primary Industry Categories from 40 CFR 122 Appendix A		
Adhesives & sealants	Inorganic chemicals mfg.	Photographic equipment/supplies
Aluminum forming	Iron & steel mfg.	Plastics processing
Auto & other laundries	Leather tanning & finishing	Plastic/synthetic materials mfg.
Battery mfg.	Mechanical products mfg.	Porcelain enameling
Coal mining	Nonferrous metals mfg.	Printing & publishing
Coil coating	Ore mining	Pulp & paper mills
Copper forming	Organic chemicals mfg.	Rubber processing
Electrical/electronic components	Paint & ink formulation	Soap & detergent mfg.
Electroplating	Pesticides	Steam electric power plants
Explosives mfg.	Petroleum refining	Textile mills
Foundries	Pharmaceutical preparations	Timber products processing
Gum & wood chemicals		

7.4 Step B: Determining WET requirements

Are WET requirements needed (Figure 6)?

If a risk of aquatic toxicity exists, then the permit writer must determine whether the permit should include WET requirements. This process involves evaluating WET testing data (if available) to assess the reasonable potential for the effluent to cause toxicity and, therefore, exceed the narrative toxics criteria.

The following steps, corresponding to Figure 6, detail key decision steps for the permit writer:

Step 1. Does the applicant have existing, adequate WET test results?

- At least 10 test results from quarterly tests conducted within the past permit cycle or, for smaller sources (at the discretion of the permit writer), results from 4 tests performed in the past 4½ years. Permit writer has the option of requiring WET testing on only the most sensitive species (as established in previous tests) once 4 tests using all 3 species have been adequately performed.
- Testing must have been done on the EPA-approved species for both acute and chronic toxicity using EPA-approved methods.

- Depending on the degree of dilution at the edge of the zone of immediate dilution (ZID) and mixing zone, results should be from testing that focused on bracketing the relevant dilution to increase the likelihood of identifying the lowest observed effect level (LOEL) and no observed effect level (NOEL).

If yes, go to Step 2.
If no, require testing as detailed in the next section, *WET Testing Requirements*.

Step 2. Do the test results indicate that the discharge meets the WET performance standard? See *Section 7.5, Evaluating WET data*.

If yes, require yearly WET test in permit and monitor for changes. If source has less than 10 test results, then permit writer should require additional WET tests to allow for 10 test results to be submitted for the next renewal application.
If no, specify WET requirements in permit as detailed in the next section, *WET Testing Requirements*. If source has less than 10 test results, then permit writer should require additional WET tests to allow for 10 test results to be submitted for the next renewal application.

WET testing requirements

See Table 9 to determine the WET testing requirements.

Table 9. WET Testing Requirements

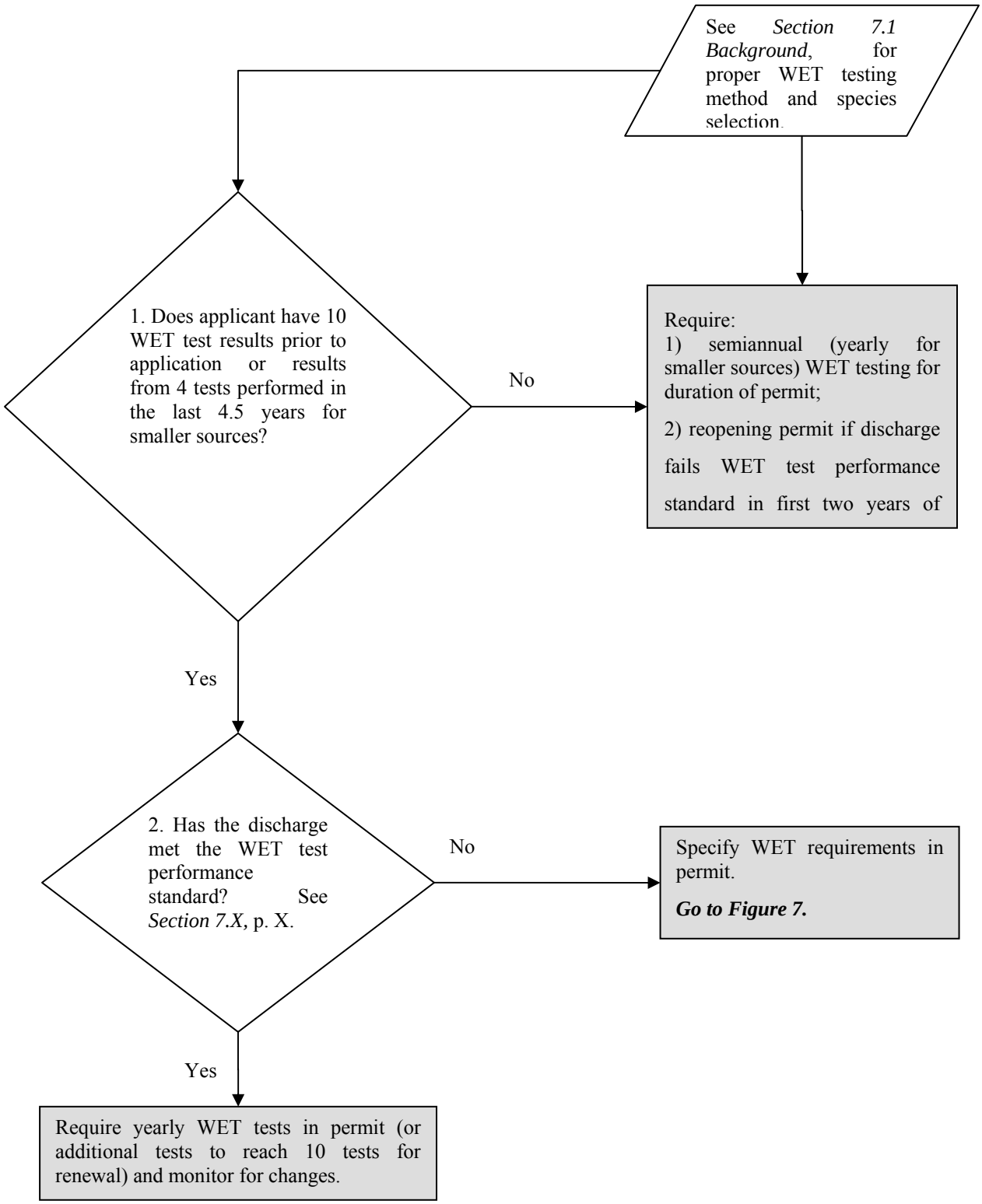
IF there are	AND the results	Then
No data	NA	1) require semiannual (yearly for smaller sources) WET testing for duration of permit; 2) may reopen permit if discharge fails WET test performance standard in first two years of permit; and 3) ***Go to Figure 7***
Partial data	Meets performance standard	No WET requirements; monitor for changes in process; require yearly WET tests in permit.
	Fails performance standard	1) 1) require semiannual (yearly for smaller sources) WET testing for duration of permit; 2) Specify WET compliance requirements in permit and compliance monitoring; and 3) ***Go to Figure 7.***
Sufficient data	Meets performance standard	No WET requirements; monitor for changes in process; require yearly WET tests in permit.
	Fails performance standard	1) Specify WET compliance requirements in permit and compliance monitoring; and 2) ***Go to Figure 7.***

Additional testing: bio-assessment studies

Although following the EPA WET testing methodology using a fish, an invertebrate, and a plant significantly increases the likelihood of detecting aquatic toxicity from the whole effluent if it exists, there remains a chance that such tests will fail to predict toxicity to local biota. Therefore, the use of bioassessment methods could add important information for evaluation of an application and should be considered when appropriate. Surveys to identify and enumerate macroinvertebrates (the Department has adopted a modified version of Water Quality Monitoring Guide as the appropriate methodology; contact the Watershed Assessment section of the DEQ Laboratory Division for details) above and below a discharge outfall can be used in conjunction with laboratory WET tests to more fully characterize the chance that an effluent poses a risk of aquatic toxicity.

At this time, the Department will not require such bioassessment studies for fulfilling the WET requirements for the purposes of issuing a permit. However, permit writers should consider including bioassessment monitoring when a permittee fails to meet a performance standard during routine monitoring. Such bioassessment monitoring should be conducted in parallel with traditional laboratory WET testing so that results can be compared to give a more complete assessment of potential effects of the discharge on the receiving water. In the case of conflicting results between the laboratory WET test and the bioassessment monitoring, the laboratory WET test results should carry precedence (until such time that the Department's experience with bioassessment monitoring indicates a need to change this approach).

Figure 6. WET Testing: Determining Limits.



7.5 Evaluating WET data and determining next steps

Evaluating WET data

The permit writer must evaluate WET test results to determine if the performance standard is being met. Figure 7 provides an overview of the decision process for evaluating WET data and determining what actions the permittee must take in response to this evaluation.

Step 1. If the discharge is in compliance, then WET monitoring is continued according to the frequency and conditions specified in the permit. If the discharge is not in compliance then further evaluation is necessary.

- Acute toxicity: If there is no statistical difference between the WET test results from the effluent sample dilution as allowed by a ZID (100% effluent sample if no ZID) and control groups at a significance level of α=0.05
- Chronic toxicity: If there is less than 25% inhibition of growth or other chronic effect (e.g., reproduction), there is no indication of chronic toxicity and the discharge complies.

Evaluating WET test results is not an easy task. EPA provides several guidance documents on this issue (see *Test Methods* in Section 7.1), but the permit writer is not expected to be an expert on the subject.

What to do when WET tests indicate toxicity

If WET testing indicates a problem with ongoing toxicity, the permit writer must determine if further monitoring is required or a toxicity identification/reduction evaluation plan should be prepared. Which determination to make depends on whether the permittee acknowledges the toxicity of the effluent or believes the WET testing results are inaccurate.

Permittee does not acknowledge toxicity of effluent

Step 2. If the permittee does not acknowledge that the effluent is toxic (e.g. claims that WET monitoring tests are erroneous), then permit writer should require:

a. Submission of results from three (3) monthly acute/chronic tests that repeat the monitoring tests that returned indications of toxicity, and
b. Possibly at least one (1) bio-assessment test to be done simultaneously with one of the acute/chronic tests.

These increased monitoring requirements should resolve any uncertainty regarding the initial results and prevent delay of the steps necessary to come into compliance.

Step 3a. *Further testing indicates no impact:* If the result of the increased

WET monitoring reveals no further occurrence of toxicity and the bio-assessment indicates no adverse impact, then the permit writer requests and reviews the permittee's transient toxicity report that documents the possible causes and prevention of the transient toxicity. See *Transient toxicity report* later in this section for information on what needs to be in this report.

Note: If the bio-assessment indicates an adverse impact, then further bio-assessment monitoring should be required in support of the subsequent permit application. After filing the acceptable transient toxicity report, the permittee conducts further monitoring according to the frequency and conditions specified in the permit. For more information, see *When WET test and bio-assessments differ*, p. 51.

Further testing indicates impact: If the results of increased WET test monitoring indicate further occurrence of toxicity, then the process of developing a toxicity identification/reduction evaluation plan is initiated regardless of the bio-assessment monitoring results.

Step 4. Evaluate if the reduction effort is successful.

- If the reduction effort is unsuccessful, then the permittee must continue to carry out the TI/RE plan until the cause of the toxicity is clearly identified through the TI/RE, or toxicity is eliminated.
- If the reduction effort is successful, then the permittee conducts further monitoring according to the frequency and conditions specified in the permit.

Permittee acknowledges toxicity of effluent

Step 2. If the permittee acknowledges that the effluent is toxic, then the permit writer requests a toxicity identification/reduction evaluation plan from the permittee for Department review and approval within 60 days of receipt of the final test results. See *Toxicity Identification/Reduction Evaluation Plan*, for more information on this plan requirement.

Step 3b. Evaluate results of the TI/RE plan to determine whether the source of the toxicity is apparent.

1. If "no," then the permittee continues to carry out the TI/RE plan until the source of the toxicity is identified or toxicity is eliminated through other actions.
2. If "yes," then the permit writer should allow the permittee 2 to 6 months to confirm the identity of and eliminate the source of toxicity. The Department may allow up to six months before the permittee initiates the investigation outlined in the EPA manuals for facility personnel to attempt to control the most likely sources of toxicity through efforts such as changes in plant operation,

replacement of a toxic material used in the facility, or improvement of best management practices.

Step 4. Evaluate if the reduction effort is successful.

- If the reduction effort is unsuccessful, then the permittee must continue to carry out the TI/RE plan until the cause of the toxicity is clearly identified through the TI/RE, or toxicity is eliminated.
- If the reduction effort is successful, then the permittee conducts further monitoring according to the frequency and conditions specified in the permit.

When WET results and bio-assessments differ

If the results from the laboratory WET tests conflict with those of the bio-assessment study, then the results of the laboratory WET tests should be used to decide whether to file a transient toxicity report or develop a toxicity identification/reduction evaluation plan. In the case where results from laboratory WET tests are unclear (i.e. some low level toxicity is suggested but is not definitive), then the bio-assessment results can be used to decide on which path to proceed.

Interpretation of the possible outcomes of laboratory WET tests and bio-assessment monitoring is shown in the following table:

If WET test results indicate:	and bio-assement results indicate:	Then require:
Toxicity	Adverse impact	Toxicity Identification/Reduction Evaluation Plan
	No impact	Toxicity Identification/Reduction Evaluation Plan
No Toxicity	Adverse impact	Transient toxicity report & additional bio-assessment monitoring
	No impact	Transient toxicity report

Transient toxicity report

The transient toxicity report must include:

1. The results of the initial failed WET test,
2. The results of the follow up WET tests/bio-assessment studies, and
3. An explanation for the initial failed WET test, e.g. WET test result is an outlier due to high rainfall or ammonia value.

Toxicity Identification/ Reduction Evaluation

This plan should follow the steps described in the latest versions of EPA manuals (and references therein), such as (but not limited to):

- "Toxicity reduction evaluation guidance for municipal wastewater treatment plants" (EPA 833/B-99-002;

Plan

http://www.epa.gov/npdes/pubs/tre.pdf)

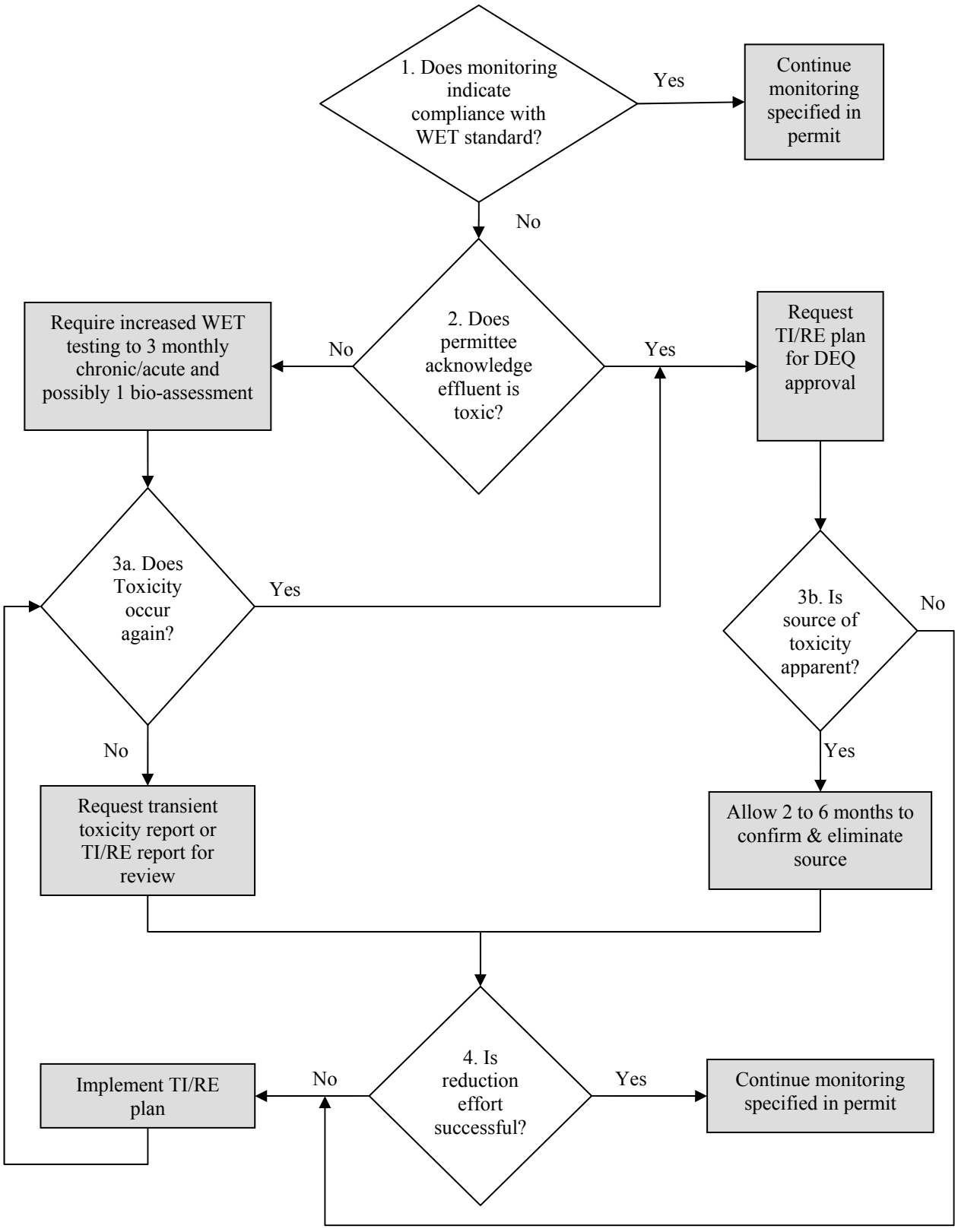
- "Generalized methodology for conducting industrial toxicity reduction evaluations" (EPA 600/2-88-070)
- "Toxicity Identification Evaluations: Characterization of Chronically Toxic Effluents, Phase I" (EPA 600/6-91-005F)

Removing WET requirement

A specific requirement in the permit to comply with the WET performance standard may be removed upon permit renewal if:

1. The permittee has demonstrated compliance with the WET performance standard associated with that limit for at least the last 3 consecutive test years following effluent characterization or for an entire subsequent permit term, and
2. There have been no changes made to operations or effluent quality within the last three years that would otherwise require additional effluent characterization.

Figure 7. WET Testing: Compliance and Enforcement.



Appendix F: Intake Credits

Introduction

On June 16th Oregon Environmental Quality Commission adopted into rule (OAR 340-045-0105) the use of *Intake Credits* for determining reasonable potential (RP) and establishing water quality based effluent limits (WQBELs). The intake credit provision allows a permit writer to quantify the amount of a pollutant (*intake pollutant*[63]) in a facility's source water and deduct a corresponding amount from the facility's estimated discharge when evaluating reasonable potential or demonstrating compliance with an effluent limit. The impact of this provision is that a facility is only held accountable for their direct impacts to the source water and water quality. Previously, a facility would have been responsible for any pollutants contained in the source water plus their direct impacts.

A permit writer might initially consider the use of an intake credit after reviewing *Tier 1* monitoring results. If there are indications that a significant portion of an identified Pollutant of Concern (POC) can be attributed to the source water, the permit writer should require the facility to include appropriate source investigation steps in their *Sampling Plan* and *Tier 2* monitoring.

In implementing an intake credit, the permit writer will need to assemble adequate data to quantify both the pollutant concentration and volume of the source water withdrawn, demonstrate that the a series of conditions has been met, and use the resultant findings in the RP and WQBEL calculations. Finally, the permit writer might need to make special considerations (i.e. on-going monitoring requirements, or treatment performance measures) attributed to intake credits when finalizing the permit.

Reasonable Potential Threshold Conditions

The Intake Credit rules have a series of threshold conditions that must be met in order for the use of an intake credit to determine RP. There are also a similar set of conditions that must be met for the use of an intake credit to establish WQBELs. The permittee must satisfy all the following five conditions to qualify for the "**reasonable potential**" use of the procedure:

1. *The facility withdraws 100 percent of the intake water containing the pollutant from the same body of water into which the discharge is made*;

   An intake pollutant is considered to be from the "same body of water" as the discharge if the intake pollutant would have reached the vicinity of the outfall point in the receiving water within a reasonable period had it not been removed by the permittee. This finding may be deemed established if:

   - There is a direct hydrological connection between the intake and discharge points;
   - The background concentration of the pollutant in the receiving water (excluding any amount of the pollutant in the facility's discharge) is similar to that in the intake water; and
   - Water quality characteristics (e.g., temperature, pH, hardness) are similar in the intake and receiving waters.

   An intake pollutant from groundwater may also be considered to be from the "same body of water" if the aforementioned conditions are met and the pollutants are not a result of human

[63] An "intake pollutant" is the amount of a pollutant that is present in public waters (including groundwater) at the time it is withdrawn from such waters by the discharger or other facility supplying the discharger with intake water.

activity such as industrial, commercial, or municipal operations, disposal actions, or treatment processes.

2. *The facility does not contribute any additional mass of the identified intake pollutant to its wastewater Mass Conditions*

   Any facilities (or municipalities) introducing a measurable mass of the pollutant into an effluent stream would not be allowed an intake credit for that pollutant when determining RP.

3. *The facility does not alter the identified intake pollutant chemically or physically in a manner that would cause adverse water quality impacts to occur that would not occur if the pollutants were left in-stream;*

   Of particular concern are shifts in pollutant speciation that might result in increased toxicity (e.g. Chrome III to Chrome VI)

4. *The facility does not increase the identified intake pollutant concentration at the edge of the mixing zone, or at the point of discharge if a mixing zone is not allowed, as compared to the pollutant concentration in the intake water, unless the increased concentration does not cause or contribute to an excursion above an applicable water quality standard; and*

   In most cases the receiving water body will exceed the water quality criterion, although in rare instances a small amount of assimilative capacity might be available and a intake credit in conjunction with an intake credit would be allowed.

5. *The timing and location of the discharge would not cause adverse water quality impacts to occur that would not occur if the identified intake pollutant were left in-stream.*

WQBEL Threshold Conditions

The Intake Credit rules have a series of threshold conditions that must be met in order for the use of an intake credit to establish WQBELs. A summary and brief explanation of the conditions is presented below: (please note that these conditions are numbered *6 - 10* so they can be uniquely referred to later in the discussion)

6. *The facility withdraws 100 percent of the intake water containing the pollutant from the same body of water into which the discharge is made;*

   Please refer to the guidance described in Condition #1

7. *The observed maximum ambient background concentration and the intake water concentration of the pollutant exceeds the most stringent applicable water quality criterion for that pollutant;*

   The intent of the condition is to limit the use of intake credit based WQBELs to bodies of water that are determined, or have the potential to be determined as “water quality limited”.

8. *The facility does not alter the identified intake pollutant chemically or physically in a manner that would cause adverse water quality impacts to occur that would not occur if the pollutants were left in-stream;*

   Please refer to the guidance described in Condition #3

9. *The facility does not increase the identified intake pollutant concentration, as defined by the department, at the point of discharge as compared to the pollutant concentration in the intake water; and*

10. *The timing and location of the discharge would not cause adverse water quality impacts to occur that would not occur if the identified intake pollutant were left in-stream.*

Intake Credit Procedure

The following is a discussion of the steps the permit writer should pursue to evaluate each of the threshold conditions. The permit writer should document this process and include an intake credit analysis summary in the Permit Evaluation Report.

Reasonable Potential Threshold Evaluation

Step 1: The permit writer should collect available data with the intension of evaluating the RP and WQBEL threshold conditions. Typically, the data required to perform all of these evaluations (especially *Condition #'s 3, 4 & 5*) will not be readily available, and can be resolved later in the facility's *Sampling Plan* described in ***Step 2***. This data will also be sufficient to evaluate the WQBEL *Condition #'s 8, 9 & 10*.

To evaluate *Condition #1*, the permit writer should establish the location of the source water intake points, relative to the location of the outfall. The following are likely sources of information that can be used for performing these evaluations:

- DEQ's drinking water program for well locations and logs: http://www.deq.state.or.us/wq/dwp/contacts.htm
- DEQ's LASAR and USGS's Water Data for Oregon databases for ambient surface and ground water quality data
- Oregon's municipal Drinking Water Data Online database for municipal intake concentrations, source type and well locations
- Facility permit renewal application data summary (facility file) and Discharge Monitoring Reports
- Municipal drinking water and waste water treatment plant flow and pollutant concentration records

The permit writer should develop a location map showing the outfall and various intake locations for inclusion in the Permit Evaluation Report (see **Figure 1**). The permit writer should also develop a process diagram showing the identified intake water sources, process use, treatment and discharge (see **Figure 2**).

Only those sources "upstream" of the outfall location would be permitted for consideration of an intake credit. With ground water sources (well or I&I), the permit writer need to establish the direct hydrologic connection with the receiving water body and how the pollutant would have reached the vicinity of the outfall within a reasonable period. The Drinking Water Data Online database identifies those municipal wells that are under direct influence of surface water or are located close enough to nearby surface water to receive direct surface water recharge (under Source Type). For example, the wells identified in Figure 1 are listed as "*GU - Under direct influence of surface water*" in the database.

The condition does not require that a 100% of a facility's source water come from the same body of water. Rather, the condition requires that 100% of the intake pollutant credited be from the same body of water. For facilities with multiple intakes from different bodies of water, the intake concentration should be flow weighted (see below) to reflect only those sources that meet the rule's condition (i.e. be from the same body of water).

Intake Concentration Flow Weighted Concentration Calculation

$$I_{total} = [(I_1 * Q_1) + (I_2 * Q_2) + (\ldots) + (I_n * Q_n)] / Q_{total}$$

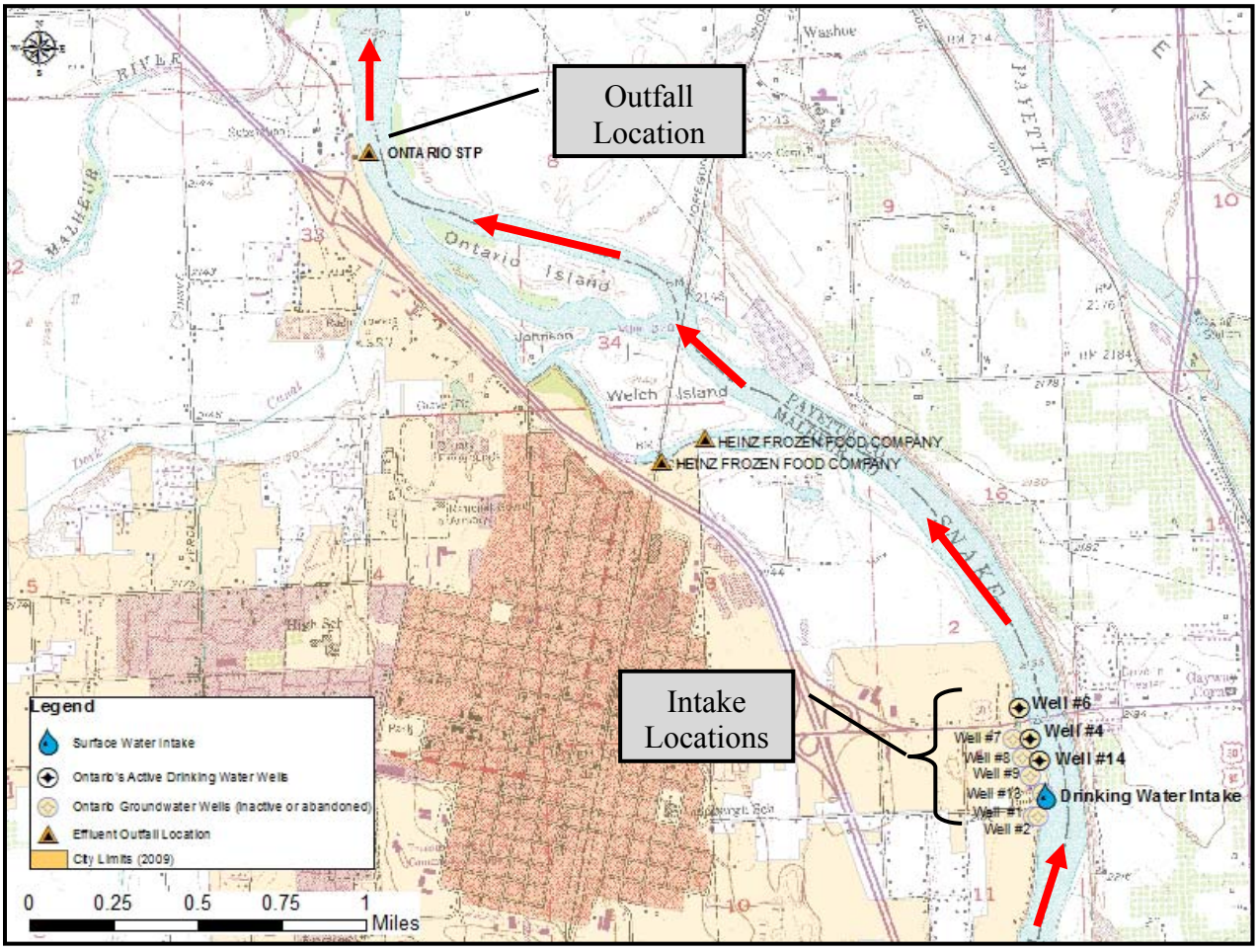
I_{total} = *Total allowable Intake concentration*

I_i = *pollutant concentration from intake source i*

Q_i = *Flow rate from intake source i*

If *Condition #1* cannot be met, the facility may not determine RP or establish WQBELs using an intake credit.

Figure 1
Example of an Intake Credit Evaluation Map



To evaluate *Condition #2*, the permit writer should investigate the facility to determine if there is the potential for additional contributions of a pollutant resulting in a measurable increase in mass. For industrial facilities, a review of the production process description, hazardous material data bases and handling records[64] may identify likely sources of pollutant contributions. For domestic facilities, the municipalities pretreatment program (if present) is the most ready source

[64] For example, Toxic Release Inventory, Oregon Hazardous Substance Information Survey forms, Material Safety Data Sheets and Hazardous Waste (RCRA) Records.

of information, although it might be necessary to review likely sources with-in the collection area followed up by further investigation. In any case (domestic or industrial) where pollutant contribution is suspected, the permit writer should request point source monitoring to confirm presence and quantify the discharge[65].

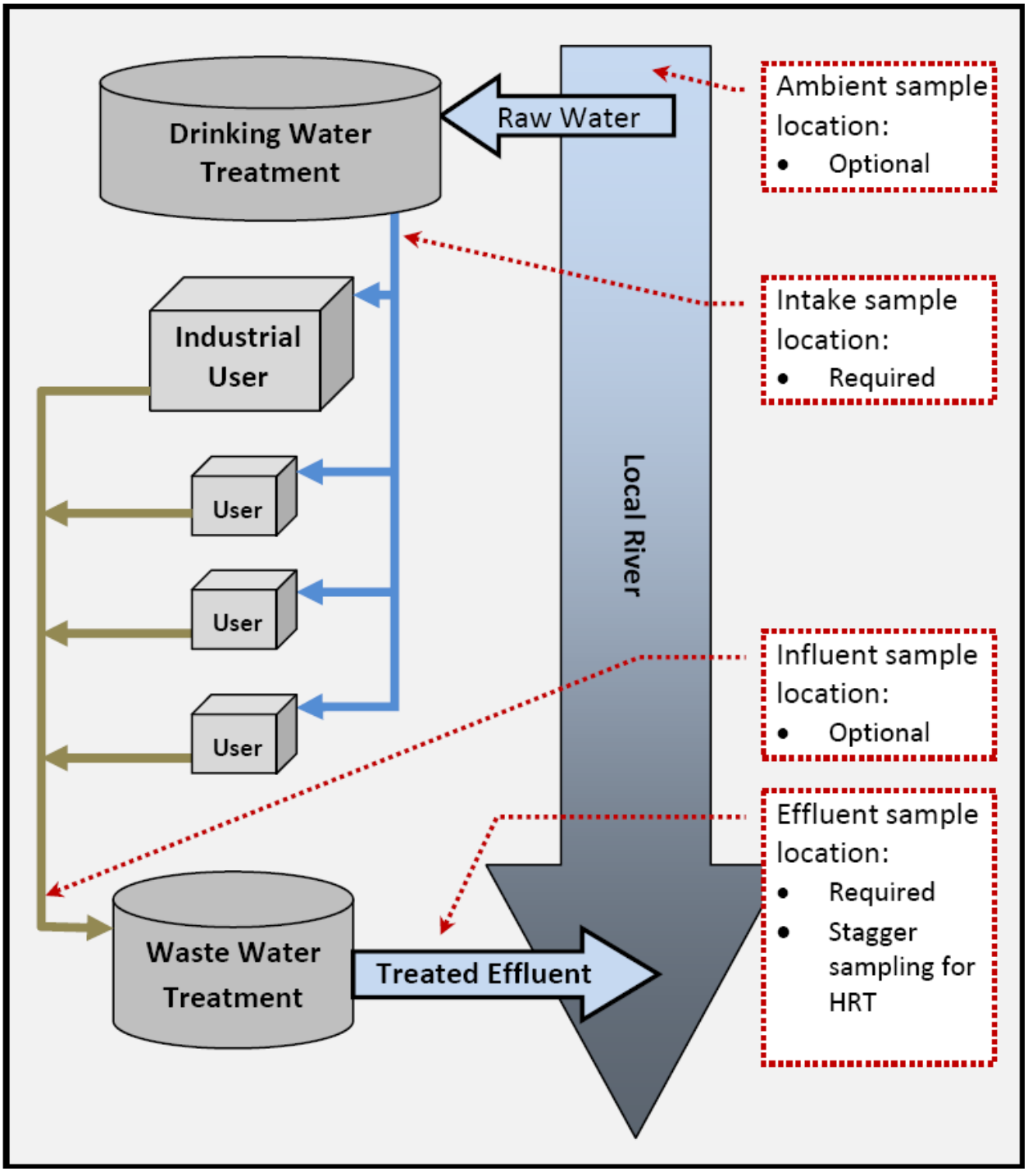
If *Condition #2* cannot be met, the facility may not determine RP using an intake credit, although there is still the potential of establishing WQBELs. Typically, the data necessary to evaluate *Conditions #3, #4* and *#5* is not readily available, and must be collected as part of the *Sampling Plan*.

Step 2: To evaluate Condition #3 and #4, the permit writer will need further characterization of the identified intake waters and discharged effluent relative to each other during the same discharge period. Unless the facility already has the necessary data, a series of parallel monitoring events and appropriate laboratory analysis must be included in the facility's *Sampling Plan*.

The *Sampling Plan* should quantify the mass and concentration of the subject pollutant in the intake waters and effluent through a series of parallel monitoring events. Ideally, flow rates should be recorded at all sample locations and, if required, the average hydrologic residence time (HRT) between intake and discharge should be estimated. A subset of the collected samples should be split and analyzed to determine if there are any physical or chemical[66] changes that would result in additional adverse water quality impacts. Where an engineering study or variance request might later be necessary, the facility might consider monitoring the ambient source water (pre-filtration) or treatment facility influent as to better characterize the process and determine treatment efficiencies (see **Figure 2**).

[65] Even if this action disqualifies the ability to conduct a RP, a WQBEL is still available and the data will assist the facility's source reduction efforts.
[66] i.e. change in speciation or pH that results in greater toxicity

Figure 2
Example of a Simple Process Diagram for a Domestic Facility w/Sample Locations



An example of the various elements described in the *Sampling Plan* is presented below:

Example of Sampling Plan Elements for Inorganic Arsenic in a POTW

Required Elements

- *7 consecutive 24-hour composite samples for:*
  - *Intake location (treated drinking water)*
  - *Effluent (may stagger sampling time from Intake by 2 days to account for system residence time)*
- *Continuous flow monitoring for the intake and effluent location during the monitoring period*
- *Analyze all samples for Inorganic Arsenic*
- *Split 2 of the aforementioned sampling events (both intake and effluent) and analyze for Total Arsenic, Inorganic Arsenic, Arsenic III, Arsenic V, pH, temperature, DO and hardness.*

Optional Elements

- *7 consecutive 24-hour composite samples for:*
  - *Ambient location (Raw water intake)*
  - *Influent (may stagger sampling time from Intake by 2 days to account for system residence time)*
- *Analyze all samples for Inorganic Arsenic*
- *Continuous flow monitoring for the influent location during the monitoring period*

Using the collected data, the permit writer will evaluate the facility for *Conditions #3* and *#4*. When evaluating *Condition #3*, the permit writer should be aware of potential changes in pollutant speciation or water chemistry that might result in an increased pollutant toxicity, mobility or bio-availability. The permit writer should also consider potential changes in temperature, flow regime, dissolved oxygen, nutrient content, etc. that might result in an adverse water quality impact. Please consult with staff in the Department's Laboratory Division or TMDL Sections when determining monitoring requirements or evaluating resultant data.

In order to evaluate *Condition #4*, the permit writer essentially needs to conduct the RPA to determine if there is an "*increase the identified intake pollutant concentration at the edge of the mixing zone*[67]*, or at the point of discharge if a mixing zone is not allowed, as compared to the pollutant concentration in the intake water."* The RPA Workbook has been modified to perform an intake credit analysis and will indicate if an intake credit is not allowed as described in **Step 3** in the next Section.

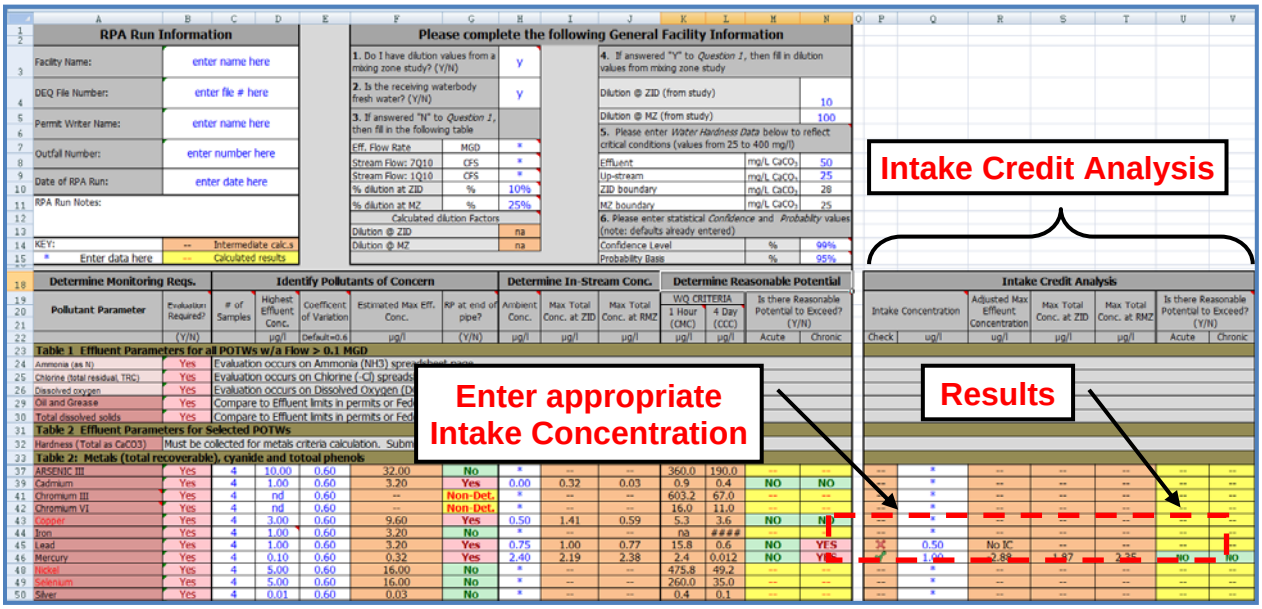
To evaluate *Condition #5*, the permit writer should consider the timing and location impacts of the discharge upon the receiving waterbody. Of particular concern, would be those waterbodies that are effluent dominated, have a very low base flows or are subject to channelization. Where it can be demonstrated that the receiving water body would be adversely impacted, a intake credit would not be permitted in determining RP.

[67] In rare cases where a receiving water body's ambient concentration is just below the water quality criteria, a mixing zone might be permitted.

If it can be demonstrated conclusively that conditions #s 1, 3, 4, & 5, cannot be met, an intake credit (for both RP and WQBEL purposes) would not be allowed and no further action should be taken. If condition #2 (*no addition of pollutant mass*) cannot be met, the facility is disqualified from using an intake credit in determining RP, but is still allowed to use an intake credit in establishing WQBELs.

Conducting a Reasonable Potential Analysis using an Intake Credit

Step 3: To apply an intake credit, it is necessary of conduct an intake credit analysis by calculating a series of adjusted effluent and ambient pollutant concentrations using an intake concentration (IC) value. This The RPA Workbook has been modified (see below) to perform this analysis, although the permit writer will still need to calculate an appropriate IC value depending upon the type of RPA (aquatic toxicity vs. human health) and the carcinogen status of the pollutant of concern.



For an Aquatic Toxicity RPA, the IC is calculated using the following instructions:

Intake Concentration calculation instructions for Aquatic Toxicity RPA

1. Calculate the Ratio of average intake concentration (I) to average effluent concentration (E)

   $$Intake\ Ratio = [(I_1+I_2+\ldots+I_n)/n] \,/\, [(E_1+E_2+\ldots+E_n)/n]$$

   **where necessary, use flow weighted individual intake values*
2. Multiply the maximum effluent concentration by intake ratio to determine intake concentration (IC) used in RPA

   $$IC = E_{max}\, x\ Intake\ Ratio$$

For a human health RPA, the IC is calculated using the following instructions:

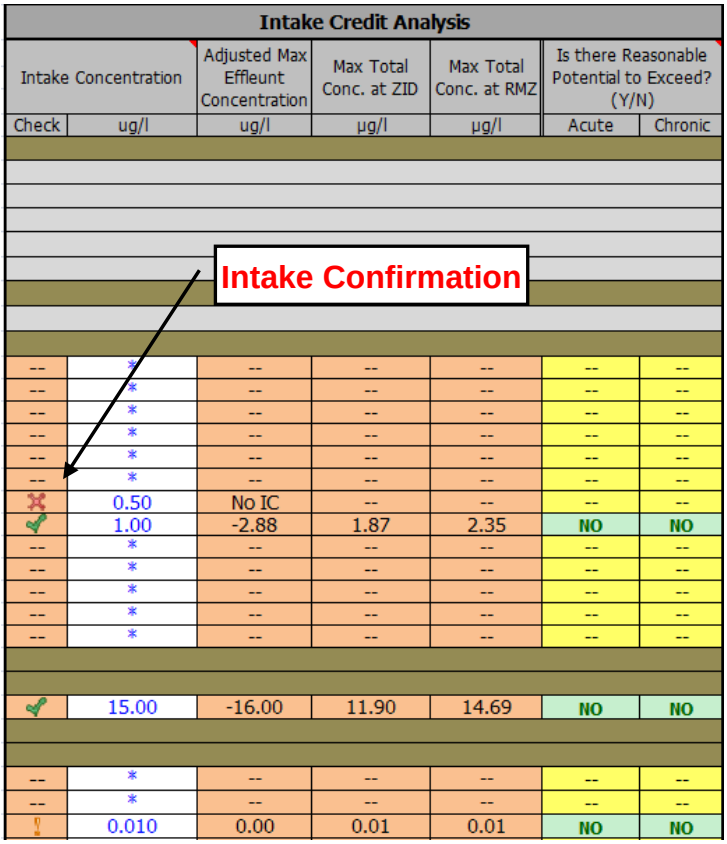
Intake Concentration calculation instructions for Human Health RPA

- For Carcinogens, use the **geometric mean** of intake data
- For Non-Carcinogens, follow instructions for **Aquatic Toxicity RPA**

**where necessary, use flow weighted intake values*

Once the appropriate IC values have been calculated and entered, the RPA Workbook checks to ensure that the IC is greater than or equal to the effluent concentration. If there is an increase in concentration, an "X" will be reported and the calculation ends per *Condition #4* in **Step 2**. In this case, the determination of RP for the pollutant of concern stands and a WQBEL would be necessary.

If there is not an increase in effluent concentration over intake, then a check mark ("√") is reported and the intake credit calculations progresses and a final RP determination is reported in the "*Is there Reasonable Potential to Exceed?*" columns (see screen shot right). If a "No" is reported, there is not RP and no WQBEL is necessary. If a "Yes" is reported, there is still RP and a WQBEL is necessary in **Step 4**.



Establishing Water Quality Effluent Limits Threshold Evaluation

Step 4: If a permittee is found to have RP, the permit writer should evaluate the WQBEL Threshold Conditions, and if met, calculate WQBELs in **Step 5**. Since most of these threshold conditions (*#6, #8 and #10*) are the same as the RP Threshold conditions (*#1, #3 and #5*), they are already met. To evaluate *Condition #7* the permit writer would review "*the observed maximum ambient background concentration and the intake water concentration of the pollutant"* and where these values "*exceed(s) the most stringent applicable water quality criterion for that pollutant"*, allow the development of a WQBEL for that parameter. This condition is to limit the establishment of WBELs using intake credits to those water bodies with ambient concentrations at or above water quality criteria. It should be noted that there are no limitations on the addition of additional mass of a pollutant to the effluent as described in *Condition #2*[68]. *Condition #9* will be met by the establishment of WQBELs that prevents the facility from increasing "*the identified intake pollutant concentration, as defined by the*

[68] Any additional mass must be removed prior to discharge as determined by *Condition #9*.

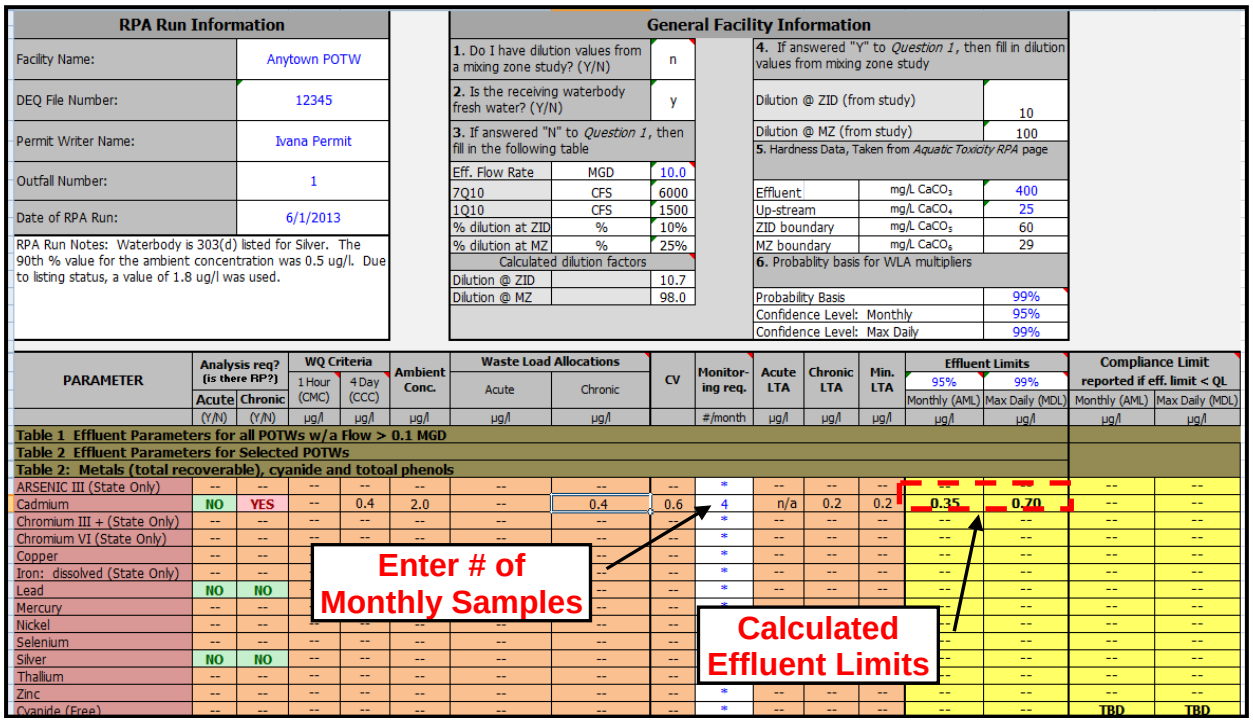
department, at the point of discharge as compared to the pollutant concentration in the intake water".

Calculating Aquatic Toxicity Effluent Limits using an Intake Credit

Step 5: If the facility has me the applicable WQBEL Threshold Conditions, a WQBEL may be established using an intake credit. The following language may be used in the permit:

> *If the (compliance) effluent monitoring results indicate that the effluent concentration of the pollutant is equal to or less than the intake concentration, then the calculated effluent limits are not applicable, and therefore, the discharge is in compliance. Otherwise, the effluent must comply with the calculated effluent limitations.*

This will require that the facility monitor both the intake source and effluent in tandem, and make a rolling comparison to ensure the terms of the language is being met. The alternative effluent limit is calculated on the Effluent Limit page of the RPA Workbook. Upon entering the number of monthly compliance samples, the Effluent Limits page will automatically calculate the applicable effluent limits as seen below:



RPA Run Information

Facility Name:	Anytown POTW
DEQ File Number:	12345
Permit Writer Name:	Ivana Permit
Outfall Number:	1
Date of RPA Run:	6/1/2013

RPA Run Notes: Waterbody is 303(d) listed for Silver. The 90th % value for the ambient concentration was 0.5 ug/l. Due to listing status, a value of 1.8 ug/l was used.

General Facility Information

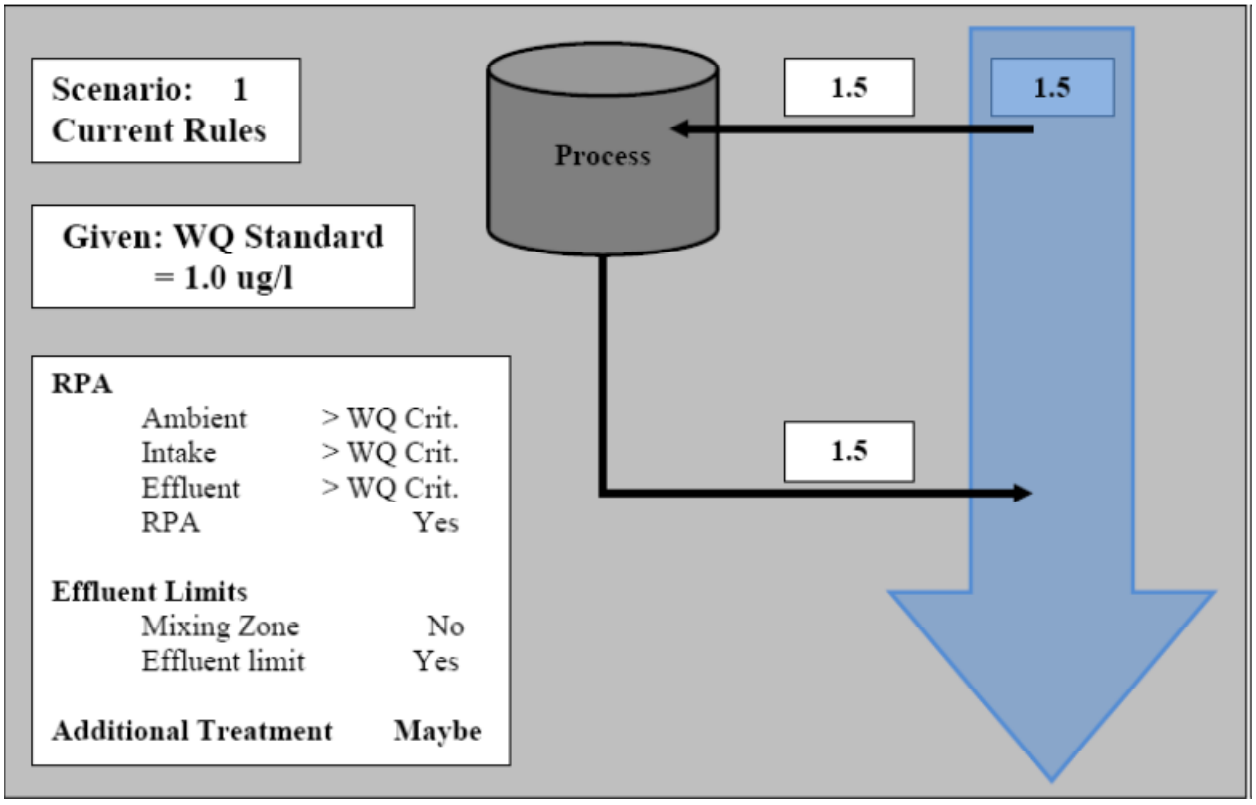
1. Do I have dilution values from a mixing zone study? (Y/N)		n
2. Is the receiving waterbody fresh water? (Y/N)		y
3. If answered "N" to *Question 1*, then fill in the following table		
Eff. Flow Rate	MGD	10.0
7Q10	CFS	6000
1Q10	CFS	1500
% dilution at ZID	%	10%
% dilution at MZ	%	25%
Calculated dilution factors		
Dilution @ ZID		10.7
Dilution @ MZ		98.0

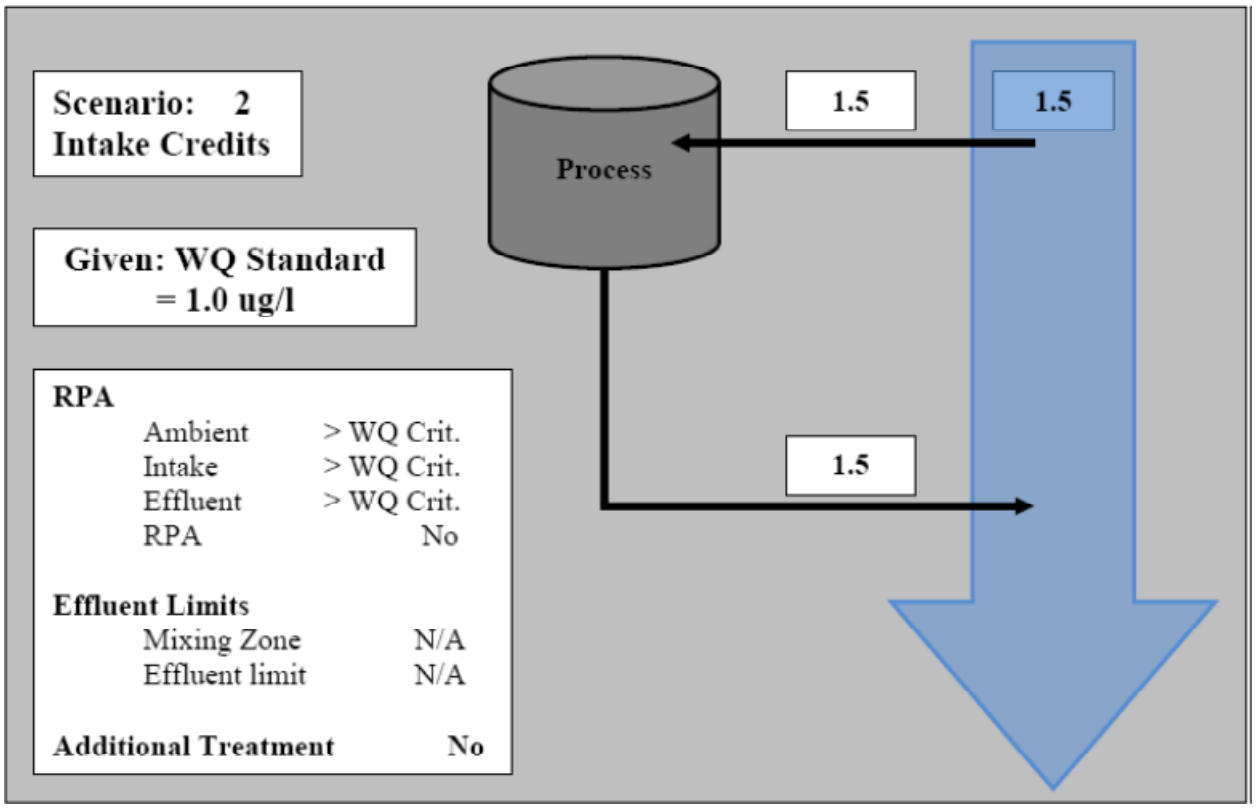
4. If answered "Y" to *Question 1*, then fill in dilution values from mixing zone study		
Dilution @ ZID (from study)		10
Dilution @ MZ (from study)		100
5. Hardness Data, Taken from *Aquatic Toxicity RPA* page		
Effluent	mg/L $CaCO_3$	400
Up-stream	mg/L $CaCO_3$	25
ZID boundary	mg/L $CaCO_3$	60
MZ boundary	mg/L $CaCO_3$	29
6. Probablity basis for WLA multipliers		
Probability Basis		99%
Confidence Level: Monthly		95%
Confidence Level: Max Daily		99%

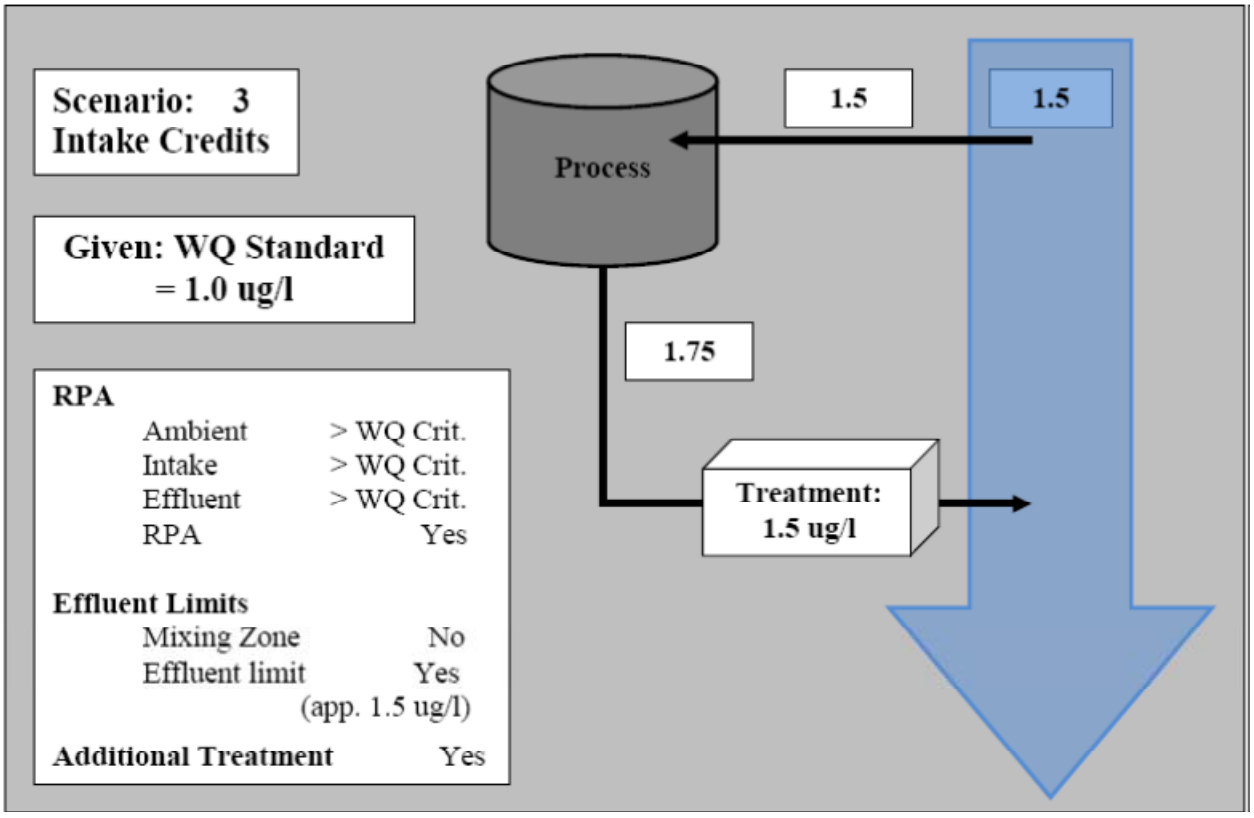
PARAMETER	Analysis req? (is there RP?) Acute	Chronic	WQ Criteria 1 Hour (CMC)	4 Day (CCC)	Ambient Conc.	Waste Load Allocations Acute	Chronic	CV	Monitoring req.	Acute LTA	Chronic LTA	Min. LTA	Effluent Limits 95% Monthly (AML)	99% Max Daily (MDL)	Compliance Limit reported if eff. limit < QL Monthly (AML)	Max Daily (MDL)
	(Y/N)	(Y/N)	µg/l	µg/l	µg/l	µg/l	µg/l		#/month	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l
Table 1 Effluent Parameters for all POTWs w/a Flow > 0.1 MGD																
Table 2 Effluent Parameters for Selected POTWs																
Table 2: Metals (total recoverable), cyanide and totoal phenols																
ARSENIC III (State Only)	--	--	--	--	--	--	--	--	*	--	--	--	--	--	--	--
Cadmium	NO	YES	--	0.4	2.0	--	0.4	0.6	4	n/a	0.2	0.2	0.35	0.70	--	--
Chromium III + (State Only)	--	--	--	--	--	--	--	--	*	--	--	--	--	--	--	--
Chromium VI (State Only)	--	--	--	--	--	--	--	--	*	--	--	--	--	--	--	--
Copper	--	--	--	--	--	--	--	--	*	--	--	--	--	--	--	--
Iron: dissolved (State Only)	--	--	--	--	--	--	--	--	*	--	--	--	--	--	--	--
Lead	NO	NO	--	--	--	--	--	--	*	--	--	--	--	--	--	--
Mercury	--	--	--	--	--	--	--	--	*	--	--	--	--	--	--	--
Nickel	--	--	--	--	--	--	--	--	*	--	--	--	--	--	--	--
Selenium	--	--	--	--	--	--	--	--	*	--	--	--	--	--	--	--
Silver	NO	NO	--	--	--	--	--	--	*	--	--	--	--	--	--	--
Thallium	--	--	--	--	--	--	--	--	*	--	--	--	--	--	--	--
Zinc	--	--	--	--	--	--	--	--	*	--	--	--	--	--	--	--
Cyanide (Free)	--	--	--	--	--	--	--	--	*	--	--	--	--	--	TBD	TBD

Various Intake Credit Scenarios

The following figures have been prepared to demonstrate a very simplistic intake credit scenario. **Scenario 1** is a simplified example where a Facility is using surface water that ambient concentration is above water quality criteria. Based upon current rule, the evaluation only reflects the concentration at the point of discharge to address the application of current rules. **Scenario 2** and **3** demonstrate the use of intake credit procedure using the same variables as in **Scenario 1** for the RPA and WQBEL calculation processes, respectively.


Scenario: 1
Current Rules
Given: WQ Standard
= 1.0 ug/l
RPA
Ambient > WQ Crit.
Intake > WQ Crit.
Effluent > WQ Crit.
RPA Yes
Effluent Limits
Mixing Zone No
Effluent limit Yes
Additional Treatment Maybe
Process
1.5
1.5
1.5


Scenario: 2
Intake Credits
Given: WQ Standard
= 1.0 ug/l
RPA
Ambient > WQ Crit.
Intake > WQ Crit.
Effluent > WQ Crit.
RPA No
Effluent Limits
Mixing Zone N/A
Effluent limit N/A
Additional Treatment No
Process
1.5
1.5
1.5



Rule Language

The following is the applicable rule language from OAR, Division 45-0105.

(1) General Provisions. The following provisions apply to the consideration of intake pollutants in determining reasonable potential under section (2) of this rule and the consideration of intake pollutants in establishing water quality based effluent limits under section (3) of this rule.

These provisions do not alter the permitting authority's obligation under 40 CFR 122.44(d)(vii)(B) to develop effluent limitations consistent with the assumptions and requirements of any available waste load allocations for the discharge, that is part of a TMDL prepared by the department and approved by EPA pursuant to 40 CFR 130.7, or prepared by EPA pursuant to 40 CFR 130.7(d).

> *(a) An "intake pollutant" is the amount of a pollutant that is present in public waters (including groundwater as provided in subsection (d), below, at the time it is withdrawn from such waters by the discharger or other facility supplying the discharger with intake water.*
>
> *(b) An intake pollutant is considered to be from the "same body of water" as the discharge if the department finds that the intake pollutant would have reached the vicinity of the outfall point in the receiving water within a reasonable period had it not been removed by the permittee. This finding may be deemed established if:*
>
> > *(A) The background concentration of the pollutant in the receiving water (excluding any amount of the pollutant in the facility's discharge) is similar to that in the intake water;*
> >
> > *(B) There is a direct hydrological connection between the intake and discharge points; and*

(C) Water quality characteristics (e.g., temperature, pH, hardness) are similar in the intake and receiving waters.

(c) The department may also consider other site-specific factors relevant to the transport and fate of the pollutant to make the finding in a particular case that a pollutant would or would not have reached the vicinity of the outfall point in the receiving water within a reasonable period had it not been removed by the permittee.

(d) An intake pollutant from groundwater may be considered to be from the "same body of water" if the department determines that the pollutant would have reached the vicinity of the outfall point in the receiving water within a reasonable period had it not been removed by the permittee, except that such a pollutant is not from the same body of water if the groundwater contains the pollutant partially or entirely due to human activity, such as industrial, commercial, or municipal operations, disposal actions, or treatment processes.

(e) The determinations made under Sections (2) and (3), below, will be made on a pollutant-by-pollutant and outfall-by-outfall basis.

(2) Consideration of Intake Pollutants in Determining Reasonable Potential:

(a) The department may determine that there is "no reasonable potential" for the discharge of an identified intake pollutant to cause or contribute to an excursion above a narrative or numeric water quality criterion contained in Oregon's water quality standards where a discharger demonstrates to the satisfaction of the department (based upon information provided in the permit application or other information) that:

(A) The facility withdraws 100 percent of the intake water containing the pollutant from the same body of water into which the discharge is made;

(B) The facility does not contribute any additional mass of the identified intake pollutant to its wastewater;

(C) The facility does not alter the identified intake pollutant chemically or physically in a manner that would cause adverse water quality impacts to occur that would not occur if the pollutants were left in-stream;

(D) The facility does not increase the identified intake pollutant concentration at the edge of the mixing zone, or at the point of discharge if a mixing zone is not allowed, as compared to the pollutant concentration in the intake water, unless the increased concentration does not cause or contribute to an excursion above an applicable water quality standard; and

(E) The timing and location of the discharge would not cause adverse water quality impacts to occur that would not occur if the identified intake pollutant were left in-stream.

(b) Upon a finding under subsection (a) of this section that an intake pollutant in the discharge does not cause, have the reasonable potential to cause, or contribute to an excursion above an applicable water quality standard, the department is not required to include a water quality-based effluent limit for the identified intake pollutant in the facility's permit, provided:

(A) The NPDES permit evaluation report includes a determination that there is no reasonable potential for the discharge of an identified intake pollutant to cause or contribute to an excursion above an applicable numeric water quality criterion and references appropriate supporting documentation included in the administrative record;

(B) The permit requires all influent, effluent, and ambient monitoring necessary to demonstrate that the conditions above in subsection (a) of this section are maintained during the permit term; and

(C) The permit contains a re-opener clause authorizing modification or revocation and re-issuance of the permit if new information shows the discharger no longer meets the conditions in subsection (a) (A) through (E) of this section.

(3) Consideration of Intake Pollutants in Establishing Water Quality Based Effluent Limits (WQBELs):

(a) The department may consider pollutants in intake water as provided in section (3) when establishing water quality-based effluent limitations based on narrative or numeric criteria, provided that the discharger has demonstrated that the following conditions are met:

(A) The facility withdraws 100 percent of the intake water containing the pollutant from the same body of water into which the discharge is made;

(B) The observed maximum ambient background concentration and the intake water concentration of the pollutant exceeds the most stringent applicable water quality criterion for that pollutant;

(C) The facility does not alter the identified intake pollutant chemically or physically in a manner that would cause adverse water quality impacts to occur that would not occur if the pollutants were left in-stream;

(D) The facility does not increase the identified intake pollutant concentration, as defined by the department, at the point of discharge as compared to the pollutant concentration in the intake water; and

(E) The timing and location of the discharge would not cause adverse water quality impacts to occur that would not occur if the identified intake pollutant were left in-stream.

(b) Where the conditions in subsection (a) of this section are met, the department may establish a water quality-based effluent limitation allowing the facility to discharge a mass and concentration of the intake pollutant that are no greater than the mass and concentration found in the facility's intake water. A discharger may add mass of the pollutant to its waste stream if an equal or greater mass is removed prior to discharge, so there is no net addition of the pollutant in the discharge compared to the intake water.

(c) Where proper operation and maintenance of a facility's treatment system results in the removal of an intake water pollutant, the department may establish limitations that reflect the lower mass and concentration of the pollutant achieved by such treatment.

(d) Where intake water for a facility is provided by a municipal water supply system and the supplier provides treatment of the raw water that removes an intake water pollutant, the concentration of the intake water pollutant will be determined at the point where the water enters the water supplier's distribution system.

(e) Where a facility discharges intake pollutants from multiple sources that originate from the receiving water body and from other water bodies, the department may derive an effluent limitation reflecting the flow-weighted amount of each source of the pollutant provided that adequate monitoring to determine compliance can be established and is included in the permit.

(f) The permit will specify how compliance with mass and concentration-based limitations for the intake water pollutant will be assessed. This may be done by basing the effluent limitation on background concentration data. Alternatively, the department may determine compliance by monitoring the pollutant concentrations in the intake water and

in the effluent. This monitoring may be supplemented by monitoring internal waste streams or by a department evaluation of the use of best management practices.

(g) In addition to the above, effluent limitations must be established to comply with all other applicable State and Federal laws and regulations including technology-based requirements and anti-degradation policies.

(h) When determining whether WQBELs are necessary, information from chemical-specific, whole effluent toxicity and biological assessments will be considered independently.

(i) Permits limits must be consistent with the assumptions and requirements of waste load allocations or other provisions in a TMDL that has been approved by the EPA.