

PPRP 104

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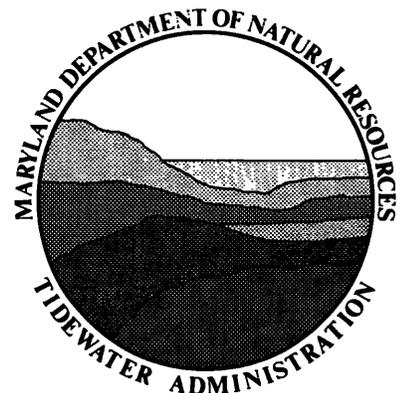
## NATIONWIDE SURVEY OF POWER PLANT AQUATIC TOXICITY ISSUES

DECEMBER 1992

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**MARYLAND POWER PLANT  
RESEARCH PROGRAM**

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**As Secretary of the Maryland Department of Natural Resources, I am convinced that public support of DNR's mission is essential if we are to restore the State's once bountiful natural resources, especially the Chesapeake Bay, to the level which earned the title "America in Miniature." The information in this publication is designed to increase your understanding of our program and of Maryland's natural resources.**

**Torrey C. Brown, M.D.**

**PPRP 104**

**NATIONWIDE SURVEY OF POWER  
PLANT AQUATIC TOXICITY ISSUES**

**Prepared for**

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**December 1992**

## **FOREWORD**

**This report was prepared by Versar, Inc., ESM Operations for Mr. Richard McLean and Dr. William Hodges of the Power Plant Research Program of the Maryland Department of Natural Resources. Aquatic toxicity issues related to the operation of steam electric power plants are analyzed through: (1) an evaluation of the data used by EPA and the states to place 10 power plants on the Clean Water Act list of toxic dischargers; and (2) a nationwide survey of state regulators.**

## **ABSTRACT**

Steam electric power plants can discharge toxic chemicals into the air and water during operation. Over the past twenty years, concerns about the possible impacts of Maryland power plant operations have resulted in studies on biocides, thermal discharges, coal pile leachate, fly ash disposal, and copper loadings from condenser tubes.

Recent concern about power plant toxic issues in Maryland has centered on the inclusion of two plants on the Clean Water Act 304(l)(C) list of toxic dischargers prepared by the Environmental Protection Agency (EPA) and the states. Under the Clean Water Act Amendments of 1987, lists are compiled of all waters impaired by toxic point source discharges (304(l)(A) list) and the dischargers responsible for listing of these waters (304(l)(C) list). In order to provide the Power Plant Research Program (PPRP) of the Maryland Department of Natural Resources with a national perspective on power plant toxics issues, data were obtained on all power plants included on the national 304(l)(C) list and a survey of state and EPA regional officials was conducted to obtain further information on toxic chemical issues at steam electric power plants. This report presents the results of the national survey and identifies aquatic toxicity issues which may be relevant to power plant operations in Maryland.

Effluent concentrations of toxic metals were responsible for the listing of seven of the ten power plants, with copper and nickel listed most frequently. Corrosion and erosion of copper-nickel alloys are the most likely source of these metals. Metals are also a concern because of their release from ash ponds and storage facilities. Issues most frequently identified by state and EPA officials were: (1) metal toxicity; (2) implementation of biomonitoring requirements; (3) the use of bromine as a biocide; and (4) the use of cleaning compounds and additives. The report summarizes the survey data and discusses the varying approaches among the states for monitoring potential toxicity.

## **ACKNOWLEDGEMENTS**

The authors are grateful to all of the state officials who completed the survey. For the Maryland section of the report, the contributions of Mr. Melvin Knott of Maryland Department of the Environment, and Ms. Marcia Olson of Potomac Electric Power Company are greatly appreciated. We thank Mr. Richard McLean and Dr. William Hodges of the Maryland Department of Natural Resources, Power Plant Research Program for reviewing the report. The comments of Mr. Horacio Tablada of Maryland Department of the Environment and Ms. Kristy Bulleit on behalf of the Utility Water Act Group are appreciated. The document was prepared under Versar contract number 5160-023-01. The authors assume full responsibility for the content of the report.

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## **1.0 INTRODUCTION**

Steam electric power plants can discharge toxic chemicals into the air and water during operation. Over the past twenty years, concerns about the possible impacts of Maryland power plant operations have resulted in studies on biocides, thermal discharges, coal pile leachate, fly ash disposal, and copper loadings from condenser tubes (PPER 1991).

Recent concern about power plant toxic issues in Maryland has centered on the inclusion of two plants on the Clean Water Act 304(l)(C) list of toxic dischargers prepared by the Environmental Protection Agency (EPA) and the states. Under the Clean Water Act Amendments of 1987, lists are compiled of all waters impaired by toxic point source discharges (304(l)(A) list) and the dischargers responsible for listing of these waters (304(l)(C) list). In order to provide the Power Plant Research Program (PPRP) of the Maryland Department of Natural Resources with a national perspective on power plant toxics issues, data were obtained on all power plants included on the national 304(l)(C) list and a survey of state and EPA regional officials was conducted to obtain further information on toxic chemical issues at steam electric power plants. This report presents the results of the national survey and identifies aquatic toxicity issues which may be relevant to power plant operations in Maryland.

## **2.0 METHODS**

Information used in the analysis of power plants on the 304(l)(C) list was obtained from EPA and state regulators. The data of interest were: (1) the chemical(s) and concentration(s) responsible for the listing, and (2) the status of any permit modifications (Individual Control Strategies [ICSs]) or court cases made in response to the listing.

Mr. Charles Kaplan, EPA's national "power plant expert", assisted in the identification of state regulators and EPA regional personnel with expertise in power plant issues. Toxicity issues associated with power plant discharges were discussed with Mr. Kaplan and EPA regional contacts. After these conversations, a questionnaire was prepared which was used to survey state regulatory officials. The appendix consists of the questionnaire and responses for each state.

The questionnaire was conducted through telephone interviews with the state officials identified by EPA regional personnel. Each completed questionnaire was sent to the state official(s) interviewed for verification of the responses. For several states, follow-up calls were made to verify or expand responses.

## **3.0 RESULTS**

### **3.1 NATIONAL OVERVIEW**

#### **3.1.1 Power Plants on the Nationwide 304(l)(C) List**

The ten power plants included on the 304(l)(C) list are provided in Table 3-1, along with the reasons for inclusion, and the status of ICSs. For most states, plants were placed on the list if effluent concentrations (or instream concentrations after calculations of mixing) exceeded state or federal ambient water quality criteria.

A different method for determining whether a facility should be listed was applied in New Jersey and New York (W. Jackson, EPA Region II, personal communication). In these states, waterbodies with substantial point source discharges that were not in compliance with state or federal standards were identified in the 304(l)(A) list (the list of impaired waters in the state). Then, all major dischargers to each of these waterbodies were placed on the 304(l)(C) list. For New Jersey, this procedure resulted in the inclusion of the PSE&G Bergen, Hudson, and Linden plants, even though no chemical monitoring data from power plant effluents were used in the listing process. For New York, 11 plants were initially placed on 304(l)(C) under this procedure. However, a review of effluent data by state officials resulted in the later removal of all New York plants from the 304(l)(C) list.

Geographically, the 10 plants on the national 304(l)(C) list are in EPA Regions II, III, and IV. Six plants discharge to estuarine waters, three to fresh waters, and one to saline water. The receiving waters are mostly small rivers. Small rivers, where discharges can represent a large fraction of total flow, are more likely to be included on the list of impacted waters than are larger waterbodies, where discharges are usually a small fraction of flow. The absence of any Region I plants may be attributable to their location on larger rivers and on the ocean (T. Landry, EPA Region I, personal communication).

With the exception of chloroform, which was listed as a chemical of concern at one plant, no organic chemicals were identified as the basis for inclusion of power plants on the 304(l)(C) list. Copper and nickel were identified at three plants. Copper-nickel alloys are commonly used in power plant condenser tubing. Corrosion of the tubing is a possible source for the detection of these metals in cooling water effluents. Selenium was of concern at a North Carolina power plant where ash pond effluents have been released into a reservoir. Zinc (which is also present in some condenser tubing alloys) was found at levels exceeding the acute ambient water quality criterion at one plant. The remaining metals (beryllium, cadmium, hexavalent chromium, silver, and thallium) were found at levels exceeding chronic criteria at one plant.

| State          | Power Plant                         | Water Type <sup>(b)</sup> | Location                               | Reason for Listing  | ICS  |
|----------------|-------------------------------------|---------------------------|--|---|--|
| Delaware       | DP&L Indian River                   | S                         | Indian R.                              | Copper (acute)  | Requires increased monitoring to provide a mass balance and then reduction of effluent concentrations; challenged in court   |
| Maryland       | BG&E Brandon Shores                 | E                         | Patapsco R.                            | Copper (acute)  | Awaiting results of industry court suit challenging water quality regulations  |
|                | DP&L Vienna                         | F                         | Nanticoke R.                           | Copper (acute)  |  |
| New Jersey     | PSE&G -Bergen<br>-Hudson<br>-Kearny | E                         | Hackensack R.                          | <sup>(c)</sup>  | Weekly monitoring of chemical(s) of concern for one year; monthly priority pollutant scans for one year; If these concentrations exceed standards then effluent limits will be placed in permit. |
|                |                                     | E                         | Hackensack R.                          | <sup>(c)</sup>  |  |
|                | E                                   | Hackensack R.             | nickel, zinc (acute)<br><sup>(c)</sup> |   |  |
|                | E                                   | Arthur Kill               | nickel (acute)                         |   |  |
| E              | Arthur Kill                         |                           |  |   |  |
| North Carolina | Carolina L&P--Hyco Lake             | F                         | Hyco Lake                              | selenium  | Ash handling has been modified to decrease loading.  |
| Pennsylvania   | Duquesne Light--Cheswick Power      | F                         | Tawney Run                             | beryllium, cadmium, hexavalent chromium, nickel, silver, thallium, chloroform (chronic) | Not yet finalized.   |

(a) Based on draft national 304(l)(C) list dated July 20, 1990. No changes in the facilities included on the list are anticipated for the final list to be released by EPA in summer 1992 (K. Smith, EPA, personal communication)

(b) S = Saline; E = Estuarine; F = Freshwater

(c) In New Jersey all major facilities that discharge to waters on the 304(l)(A) list were included on the 304(l)(C) list.

Under the Clean Water Act Amendments of 1987, states must submit an ICS which is intended to reduce the discharge of toxic substances from each facility included on the 304(l)(C) list. EPA has interpreted the Act so that National Pollutant Discharge Elimination System (NPDES) permits are used as the ICS mechanism for reducing discharges. In general, ICSs at power plants have called for increased monitoring to verify the existence and magnitude of the effluent concentrations exceeding standards. After verification of the discharge problems, process modifications may be required to reduce the concentrations.

ICSs for the listed plants are summarized in Table 3-1. In Delaware, the ICS for the Indian River facility called for increased monitoring to provide a mass balance and confirm the effluent problem. If confirmed, a reduction would be required through process modifications. However, the ICS has been challenged in court by the utility, which has also challenged the copper standard. ICSs for the Maryland power plants have not been issued because the Maryland Department of the Environment (MDE), the NPDES permitting authority in Maryland, is awaiting the settlement of an industry challenge to the copper standards. In New Jersey, the ICS required one year of weekly monitoring of a selected group of chemicals as well as monthly priority pollutant scans. After the monitoring period, data will be evaluated and, if necessary, stricter effluent limits may be placed on permits. These limits may require process modifications. At the Hyco Lake facility in North Carolina, an agreement had already been reached between the utility and the state to reduce selenium concentrations through process modifications. A schedule had been set to phase out the ash handling ponds and replace them with a dry facility. The ICS affirmed the agreement (J. Storm, North Carolina Department of Environmental Management, personal communication).

### **3.2 ISSUES IDENTIFIED THROUGH THE SURVEY**

While the review of power plants on the 304(l)(C) list resulted in the identification of specific toxic compounds of concern, the interviews with state and federal agency staff were intended to identify general toxic discharge issues. These communications identified four major areas of concern:

- **Biocides:** because the use of bromine is increasing, states and EPA Regions are trying to establish discharge limits.
- **Biomonitoring:** some controversy and considerable variability exist in states' approaches.
- **Chemical additives and cleaning wastes:** requirements for monitoring vary considerably among the states.
- **Metals:** the toxicity of metals in cooling water and ash pond effluents is a concern in a number of states.

The survey results are summarized in Table 3-2. Of the 47 states for which completed surveys have been received, a total of 21 states identified power plant toxics issues. In 16 states, there is either trial use or regular use of bromine as a biocide. Biomonitoring is being used currently in 29 states either as a permit requirement or a screening procedure to evaluate

| Table 3-2. Summary of survey data on power plant aquatic toxicity issues |                       |                           |   |  |                                      |
|--|-----------------------|---------------------------|---|--|--------------------------------------|
| State  | Issues <sup>(a)</sup> | 1. Bromine <sup>(b)</sup> | 2. Biomonitoring <sup>(c)</sup><br>Present/Future | 3. Additives/Cleaning<br>Wastes <sup>(d)</sup> | 4. Metals <sup>(e)</sup>             |
| Alabama  | 1,4                   | Y (trials)                | Y/Y   | N  | Y                                    |
| Alaska   | N                     | N                         | N/Y   | N  | N                                    |
| Arizona  | N                     | N                         | N/Y   | Y  | N                                    |
| Arkansas   | N                     | N                         | Y(7)/Y  | N  | N                                    |
| California   | NR                    | NR                        | NR  | NR   | NR                                   |
| Colorado   | N                     | N                         | N/Y   | N  | N                                    |
| Connecticut  | N                     | Y                         | Y/Y   | Y  | N                                    |
| Delaware   | 4                     | N                         | Y(2)/Y  | N  | Y (copper)                           |
| Florida  | 1,3,4                 | N                         | Y/Y   | Y  | Y(cadmium, copper,<br>lead, mercury) |
| Georgia  | 4                     | N                         | N/Y   | N  | Y                                    |
| Hawaii   | N                     | N                         | Y(5)/Y  | Y  | N                                    |
| Idaho  | N                     | N                         | N/Y   | N  | N                                    |
| Illinois   | 1                     | Y(7-8)                    | N/?   | Y  | N                                    |
| Indiana  | 1                     | Y(trials)                 | Y/Y   | Y  | N                                    |
| Iowa   | N                     | Y(several)                | N/Y(majors)                                       | N  | N                                    |
| Kansas   | 3                     | Y(1)                      | N/?   | Y  | N                                    |
| Kentucky   | 4                     | Y(~11)                    | Y(1)/Y  | Y  | Y (copper,selenium)                  |
| Louisiana  | NR                    | NR                        | NR  | NR   | NR                                   |
| Maine  | N                     | N                         | Y(1)/Y  | N  | N                                    |
| Maryland   | 4                     | Y(one trial)              | Y/Y   | N  | Y(copper)                            |

Table 3-2. (continued)

| State          | Issues <sup>(a)</sup> | 1. Bromine <sup>(b)</sup> | 2. Biomonitoring <sup>(c)</sup><br>Present and Future | 3. Additives/Cleaning<br>Wastes <sup>(d)</sup> | Metals <sup>(e)</sup> |
|----------------|-----------------------|---------------------------|---|--|-----------------------|
| Massachusetts  | Chlorine              | N                         | Y/Y   | Y  | N                     |
| Michigan       | Chlorine              | N                         | Y/Y(majors)   | Y  | N                     |
| Minnesota      | 1                     | Y                         | N/N   | Y  | N                     |
| Mississippi    | N                     | N                         | Y(1)/?  | N  | N                     |
| Missouri       | N                     | N(some<br>interest)       | N/?   | Y  | N                     |
| Montana        | N                     | N                         | Y/Y   | N  | N                     |
| Nebraska       | N                     | N                         | Y/Y   | y  | N                     |
| Nevada         | N                     | NA                        | NA  | NA   | NA                    |
| New Hampshire  | 2                     | N                         | N/Y   | Y  | N                     |
| New Jersey     | NR                    | NR                        | NR  | NR   | NR                    |
| New Mexico     | 4                     | Y                         | Y/Y   | Y  | Y                     |
| New York       | N                     | N(some<br>interest)       | Y/Y   | Y  | N                     |
| North Carolina | 4                     | N                         | Y(almost all)/Y                                       | Y  | Y(selenium)           |
| North Dakota   | N                     | N                         | Y(1)/Y(majors)  | Y  | N                     |
| Ohio           | Chlorine              | Y                         | N   | N  | N                     |
| Oklahoma       | 3,<br>chlorine        | N                         | Y/Y   | y  | N                     |
| Oregon         | N                     | N                         | N/N   | N  | N                     |
| Pennsylvania   | 1,4                   | Y                         | Y (3)/Y   | Y  | Y                     |
| Rhode Island   | chlorine              | N                         | Y(3)/Y  | Y  | N                     |

| Table 3-2. (continued) |                       |                           |   |  |                          |
|------------------------|-----------------------|---------------------------|---|--|--------------------------|
| State                  | Issues <sup>(a)</sup> | 1. Bromine <sup>(b)</sup> | 2. Biomonitoring <sup>(c)</sup><br>Present/Future | 3. Additives/Cleaning<br>Wastes <sup>(d)</sup> | 4. Metals <sup>(e)</sup> |
| South Carolina         | 3,4                   | N                         | Y(1)/Y  | Y  | Y                        |
| South Dakota           | N                     | N                         | N/Y   | Y  | N                        |
| Tennessee              | N                     | Y (3)                     | Y/Y   | Y  | N                        |
| Texas                  | N                     | Y(8-10)                   | Y(majors)/Y                                       | Y  | N                        |
| Utah                   | N                     | N                         | Y(1)/Y  | N  | N                        |
| Vermont                | N                     | N(one has<br>option)      | N/Y   | Y  | N                        |
| Virginia               | N                     | N                         | Y(23)/Y   | Y  | N                        |
| Washington             | N                     | N                         | Y/Y   | N  | N                        |
| West Virginia          | N                     | Y (trials)                | Y(11)/Y   | Y  | N                        |
| Wisconsin              | 1                     | Y(1)                      | N/Y   | N  | N                        |
| Wyoming                | N                     | N                         | ?/N   | Y  | N                        |

- (a) Issues: (1) Use of bromine, (2) Application of biomonitoring requirements  
(3) Special concerns about cleaning compounds and additives  
(4) Concerns about metal toxicity.  
N = No issues identified
- (b) Bromine: Y = One or more plants are currently using bromine
- (c) Biomonitoring: Present: Y = One or more plants has a biomonitoring requirement; Future: Y = Biomoinitoring will be added on a case-by-case basis.
- (d) Additives/cleaning wastes there are specific procedures for evaluating the impacts of these discharges.
- (e) Metals: Y = Metals toxicity issues have been identified.
- NR No response to survey  
NA Not applicable

effluent toxicity. Specific procedures to monitor chemical additives, cleaning compounds, or cleaning wastes are in place in 30 states. Metal toxicity is of concern in 10 states.

### 3.2.1 Biocides

The information in this section, along with a discussion of alternate approaches for controlling biofouling at power plants, can be found in a report prepared for the Power Plant Research Program by Pinkney (1992).

Most states have effluent limitation guidelines for chlorine based on EPA's best available technology economically achievable (BAT) (40 CFR 423.13). Under these limitations, total residual chlorine (TRC) may not be discharged from a generating unit for more than 2 hours unless the plant can show that longer discharges are required for macroinvertebrate control. The maximum effluent concentration is 0.20 mg/L TRC for plants greater than or equal to 25 megawatts. The regulation does not require that an average concentration be maintained. For plants that are less than 25 megawatts, the average and maximum concentrations are 0.20 and 0.50 mg/L free available chlorine.

There is considerable interest in the use of bromine as a biocide, either alone or in addition to chlorine. When used in combination with chlorine, it reduces the total amount of chlorine required for fouling control. Many utilities are also using a bromine formulation (ACTI-BROM<sup>®1</sup>) that contains a surfactant. The attraction of bromine biocides to utilities is that biocidal activity is maintained while the facility is able to stay well below the 0.2 mg/L TRC limit. The cost of chlorine vs. a mix of chlorine and bromine is roughly equal (P. Redmond, EPA Region V, personal communication). Currently, there are no federal BAT limits or ambient water quality criteria for bromine; NPDES discharge permit limits for bromine are set by state and EPA regional permit writers.

The chemistry of the use of sodium bromide in conjunction with chlorine is that sodium bromide is oxidized by hypochlorous acid (HOCl) to hypobromous acid (HOBr) and sodium chloride. The HOBr results in bromine residuals which are less stable than chlorine residuals and should decay faster. Bromine residuals are more reactive than chlorine residuals and should have greater biocidal activity (Bongers et al. 1991). In addition, the use of sodium bromide (in the presence of ammonium salts) would prevent the formation of chloramines which are toxic to aquatic life and decay slowly. Therefore, the advantage of using bromine as a biocide is that it should exert a greater toxicity on a shorter term basis than chlorine without producing toxic byproducts.

The biocidal effectiveness of bromine is about four times that of chlorine on a concentration basis (Pete Redmond, EPA Region V, personal communication). Many of the Region V utilities use a mix of bromine and chlorine. The region is currently recommending that permits contain bromine discharge limits of 0.05 mg/L total residual oxidant (TRO), which (corresponding to its greater toxicity) is one-fourth of the limit for chlorine.

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<sup>1</sup> ACTI-BROM<sup>®</sup>: registered trademark of NALCO Chemical Co., Naperville, IL

The Sodium Bromide Panel of the Chemical Manufacturers Association sponsored studies of the toxicity and environmental fate of bromine (Bongers et al. 1991). Continuous and intermittent (40 minutes every 8 hours) exposures were conducted on both fresh-and saltwater organisms. It is best to compare chlorine and bromine toxicity in terms of microequivalents per liter total residual oxidant (TRO) because: (1) the speciation of the individual oxidants is not known; (2) the measurement method for both chlorine and bromine determines total residual oxidant in terms of iodine equivalents per liter; and (3) the toxicities and rates of decay of chlorine and bromine-induced oxidants are different.

In continuous exposure tests, bromine oxidants were about twice as toxic as chlorine oxidants (on a  $\mu\text{eq}$  TRO basis) for the golden shiner (*Notemigonus crysoleucas*), rainbow trout (*Oncorhynchus mykiss*), mysid shrimp (*Mysidopsis bahia*), and about 5 times as toxic for the amphipod, *Hyalella azteca*, and the silverside (*Menidia beryllina*). For the intermittent exposures, bromine oxidants were about 1.7 times as toxic as chlorine oxidants for all tested species (Bongers et al. 1991).

Measurements of the rate of oxidant decay were made on the water used for the toxicity tests. The rate of decay was substantially increased when sodium bromide was added to chlorine at 1.5 times the stoichiometric concentration of chlorine. In freshwater, at the end of six hours, TRO decreased from about 25.4  $\mu\text{eq/L}$  to about 12.7  $\mu\text{eq/L}$  in the absence of sodium bromide. When sodium bromide was added, it decreased from 25.4 to 7.6  $\mu\text{eq/L}$ . In saltwater, in the absence of sodium bromide, TRO decreased from 28.2 to 9.9  $\mu\text{eq/L}$  over six hours. When sodium bromide was added, TRO decreased from 28.2 to 2.2  $\mu\text{eq/L}$ . Thus, the addition of sodium bromide appears to be beneficial in reducing the concentrations of the toxic species (TRO) in discharges and receiving waters.

Bongers and Furth (1991) combined the toxicity and decay rate data from the Bongers et al. (1991) study to estimate environmental impacts associated with the use of chlorine and bromine. The adverse impacts of biocide use are dependent on these factors and on the amount of mixing in the receiving system. The authors argue that there are significant environmental benefits associated with the use of bromine. They attribute the benefits to the relatively lower amount of bromine required for biofouling control and the more rapid decay rate. Further research is needed to determine whether in-stream effects from combined sodium bromide/chlorine discharges are less than those from chlorine alone.<sup>2</sup>

The Alabama Department of Environmental Management (ADEM) is concerned about the use of bromine formulations containing surfactants. Surfactants are added to increase the biocidal action of the bromine and can be toxic at low levels (J. Moore, ADEM, personal communication). ADEM has not approved the use of any of these formulations because of their potential toxicity.

There are two main issues concerning the use of bromine. First, as use increases, states are finding existing databases to be inadequate for setting appropriate discharge limits.

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<sup>2</sup> EPA is currently reviewing these submissions in advising permit writers on bromine issues. The technical coordinator for power plant issues is Mr. Brad Mahanes (EPA, permits section, 202-260-1056). Mr. Pete Howe (EPA Region V, senior permit writer, 312-353-0233) is also a source of expertise on bromine issues.

Since no federal ambient water quality criteria are available or under development (B. Mahanes, EPA, personal communication), states are requesting that toxicity tests be conducted on representative species under water quality conditions (e.g., temperature, salinity) of the receiving stream. The second issue is the fate and effects of brominated organics which can be formed as byproducts of bromine use. According to P. Redmond (EPA Region V, personal communication), there are few data on these compounds which must be considered potential toxicants in receiving systems.

While the use of bromine and the issues related to it are relatively new, chlorine has been used as a biocide for decades. Despite a long regulatory history regarding chlorine discharges, there continue to be issues relating to the use of chlorine. Under the Clean Water Act Amendments of 1987, many states are reviewing chlorine toxicity data in order to set numerical rather than narrative water quality standards. According to P. Redmond, it is possible that adoption of numerical standards may force some plants to either modify procedures or dechlorinate their effluent.

A major new concern for freshwater power plants is the control of the zebra mussel, *Dreissena polymorpha*, which is responsible for macrofouling problems in many plants built along the U.S. Great Lakes (Macrofouling Consultants 1990). The mussels first entered the U.S. in 1985 and have the potential to infest about 70% of U.S. power plants (Lamarre 1991). The mussels can accumulate in sufficient density to cause plant shutdowns or partial shutdowns resulting in significant losses of power production and large maintenance expenses. In 1990, the U.S. Congress authorized \$150 million in funds for research and control through 1995. The federal government estimated the cumulative economic impact of the mussel at \$5 billion in the U.S. through the year 2000 (Public Law 101-646). Trulear et al. (1990) stated that utilities are currently researching the following approaches for the control of zebra mussels: mechanical/physical removal, chlorine with or without the addition of sodium bromide or ACTI-BROM<sup>®</sup>, and non-oxidizing biocides (e.g., CLAM-TROL CT-1<sup>®3</sup>).

### 3.2.2 Biomonitoring

The use of whole effluent toxicity limits and the application of biomonitoring requirements at power plants is a point of contention among environmental managers. Some states prefer to rely on discharge limits and ambient water quality standards while others have whole effluent toxicity limits for power plant effluents. Some states are using biomonitoring tests as a procedure to screen plants for effluent toxicity problems. For example, biomonitoring is a major component of South Carolina's strategy for evaluating potential toxic impacts. Facilities that use additives and cleaning agents (e.g., hydrazine) are required to perform monthly acute toxicity tests to show that undiluted effluent is not toxic. Other states have not expressed interest in this approach and instead rely on chemical monitoring or calculations of expected effluent concentrations.

States that use biomonitoring are applying a number of strategies. Some states call for dechlorinating effluents prior to testing in order to focus on the toxicity of other components of the effluent, while others do not. Since biocides are often added

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<sup>3</sup> CLAM-TROL CT-1<sup>®</sup>: registered trademark of Betz Laboratories, Inc., Trevose, PA

intermittently, the relevant time period for collecting samples for testing is unclear. The requirements for acute vs. chronic testing and the general philosophies towards the use of these tests vary considerably among states.

Since plant operations and receiving waters differ across the nation, the issue is not whether the states are consistent in their approaches, but whether the state's approach is appropriate for its particular situation. State agencies may need to review their approaches for biomonitoring at power plants to establish clear objectives.

### **3.2.3 Chemical Additives and Cleaning Wastes**

EPA (1980) listed a number of organic and inorganic chemicals that are used as additives to reduce condenser tube corrosion and inhibit scaling in plants with cooling towers (Table 3-3). Additional chemicals are used as carriers and solvents to increase the effectiveness of these additives (Table 3-3). Chromium and zinc additives, which were formerly popular, have greatly decreased in use because of concerns about metal toxicity (J. Moore, Alabama Department of Environmental Management, personal communication).

Fireside wastes are solid particles that accumulate on heat transfer surfaces of boilers such as tubing, the air preheater, and the electrostatic precipitator (Holcombe et al. 1987). Since these wastes can reduce the efficiency of the boiler, regular cleaning is required. Cleaning chemicals include hydrochloric acid, trisodium phosphate, ammoniated citric acid, ammoniated ethylenediamine tetraacetic acid (EDTA), ammonical sodium bromate, hydroacetic/formic acid, and sulfuric acid (EPA 1980). The most common chemicals in boiler cleaning wastes are iron and copper which are commonly used in alloys found in boiler systems.

Boiler water impurities are concentrated as boiler blowdown which can contain high levels of dissolved and suspended solids. Chemical additives used to control scale formation, modify pH, and inhibit corrosion include hydrazine, di- and tri-sodium phosphates, nitrilotriacetic acid (NTA), and EDTA (Table 3-4; EPA 1980). A number of proprietary formulations are also used. Discharges of additives in boiler blowdown may be continuous or intermittent depending on plant usage. Wastes may be discharged separately or combined with other waste streams.

The monitoring of cleaning additives and these low volume wastes is highly variable among states. In several states in EPA Region I, permits include concentration limits for these chemicals based on aquatic toxicity data supplied by the manufacturer. Other states have performed or had utilities perform tests of the toxicity of chemicals such as hydrazine on resident species. Some states use the biomonitoring tests as a method of monitoring the toxicity of these wastes. In other states, the only monitoring appears to be the performance of priority pollutant scans on the cleaning waste effluent or the combined waste stream.

**Table 3-3. Commonly used corrosion and scaling control chemicals, carriers, and solvents (from EPA 1980).**

**A. Corrosion and Scaling Control Chemicals**

Benzotriazole and its sodium salt  
Chromic Acid  
Nitrilo-tris acetic acid and its alkali metal and ammonium salts  
Organophosphorus Antiscalants including 1-Hydroxyethylidene-1,  
1- diphosphonic acid, Nitrilo-tri (methylenephosphonic acid)  
(and the alkali metal and ammonium salts of each), and Polyphosphate esters  
of low molecular weight  
Potassium hydroxide  
Sodium bisulfate  
Sodium carbonate  
Sodium dichromate  
Sodium chromate  
Sodium hexametaphosphate  
Sodium hydroxide  
Sodium mercaptobenzothiazole  
Sodium molybdate  
Sodium nitrate  
Sodium nitrite  
Sodium phosphate (mono-, di-, tri-)  
Sodium silicates  
Sodium tetraborate  
sodium tripolyphosphate  
Sulfamic acid  
Sulfuric acid  
Tetrasodium pyrophosphate  
Tetrapotassium pyrophosphate  
Ethylenediamine tetraacetic acid and its alkali metal and ammonium salts  
Tolytriazole  
Zinc chloride  
Zinc oxide  
Zinc sulfate  
Tannins  
Sodium Boro-polyphosphate  
Sodium Zinc Polyphosphate  
Calcium Zinc Polyphosphate  
Sodium Acid Pyrophosphate  
Phosphoric acid

Table 3-3. Continued

**A. Corrosion and Scaling Control Chemical (continued)**

Ethylene diamine tetrakis (methylene phosphonic acid) and its alkali metal and ammonium salts  
Hexamethylene diamine tetrakis (methylene phosphonic acid) and its alkali metal and ammonium salts  
Diethylene triamine pentakis (methylene phosphonic acid) and its alkali metal and ammonium salts  
Sodium polystyrene sulfonate and copolymers  
Carbon dioxide  
Monobutyl esters of polyethylene - and polypropylene glycols  
Acrylamide polymers and copolymers  
Polyoxypropylene glycols (min. mol. wt. 1,000)  
Sodium carboxymethylcellulose  
Sodium lignosulfonates  
Sodium polyacrylates and polyacrylic acids  
Sodium polymethacrylates  
Styrene - maleic anhydride copolymers  
Polyethylenimines  
Sodium citrate  
Alkylphenoxy polyethoxy ethanols  
Dioctyl sodium sulfosuccinate  
Poly- (amine-epichlorohydrin) condensates  
Poly - demethyl, diallyl ammonium chlorides  
Poly - (amine-ethylene dichloride) condensates

**B. Solvent or Carrier Components that may be used in Conjunction with Scaling and Corrosion Control Agents**

Dimethyl Formamide  
Methanol  
Ethylene glycol monomethyl ether  
Ethylene glycol monobutyl ether  
Methyl Ethyl Ketone  
Glycols to Hexylene Glycol  
Heavy aromatic naphtha  
Cocoa diamine  
Sodium chloride  
Sodium sulfate  
Polyoxyethylene glycol  
Talc  
Sodium Aluminate  
Monochlorotoluene  
Alkylene oxide - alcohol glycol ethers

**Table 3-4. Chemical additives commonly associated with internal boiler treatment (from EPA 1980).**

| <b>Chemical</b>  | <b>Residual Concentration in Boiler Water</b>                              |
|--|--|
| di- and tri-sodium phosphates  | 3-60 mg/L as PO <sub>4</sub> <sup>-</sup>                                  |
| Ethylenediamine tetracetic acid (EDTA)   | 20-100 mg/L  |
| Nitrilotriacetic acid (NTA)  | 10-60 mg/L   |
| Alginates<br>Polyacrylates<br>Polymethacrylates  | up to 50-100 mg/L  |
| Sodium sulfite and catalyzed<br>Sodium sulfite   | Less than 200 mg/L   |
| Hydrazine<br>Morpholine  | 5-45 mg/L  |
| Sodium hydroxide<br>Sodium carbonate<br>Ammonia<br>Morpholine<br>Hydrazine                 | added to adjust boiler water pH to the desired level, typically 8.0 - 11.0 |
| Tannins<br>Lignin derivatives  | ≤200 mg/l  |
| Starch<br>Alginates<br>Polyacrylamides<br>Polyacrylates<br>Polymethacrylates<br>Phosphates | 20-50 mg/L   |

### **3.2.4 Metals**

EPA (1980) reported that the following priority pollutant metals have been detected in waste streams from steam electric power plants: antimony, arsenic, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, thallium, and zinc. Non-priority pollutant metals of concern include iron and manganese. Power plant waste sources that may contain metals include once-through cooling water, cooling tower blowdown, ash-related wastes, coal pile runoff, metal cleaning wastes, boiler blowdown, and fireside wastes (EPA 1980).

There is also the possibility that power plants may be simply passing through metals which are present in their intake waters due to discharges from other facilities, non-point sources, and releases from sediments. Several states (e.g., Delaware and Georgia) have provisions in their water quality regulations which exempt facilities from compliance with standards if they can demonstrate that intake waters are the source of the pollutant concentrations. Cooling tower blowdown effluents tend to have higher concentrations of metals than intake waters because of the evaporative loss of water having a multiplier effect on concentrations.

Analysis of the 304(l)(C) data and results of the survey, indicate that major concerns center on arsenic, copper, nickel, selenium, and zinc. Copper and nickel are largely derived from condenser tubing and, to a lesser extent, from their presence in coal and ash. Trace amounts of zinc are present in tubing, in some scale inhibitors for cooling towers, and in coal and ash. Arsenic and selenium are primarily found in coal and ash.

Issues identified by state officials related to metal toxicity include: (1) the listing of plants on the 304(l)(C) list (as discussed above); (2) surface water and ground water contamination from ash handling; and (3) the development of numerical water quality standards.

Releases of selenium from ash basin overflows to cooling reservoirs have resulted in contamination problems in Hyco Lake and Belews Lake (North Carolina), Savannah River project (South Carolina), and Martin Lake (Texas), according to Coughlan and Velte (1989). Fish population declines have been reported in these reservoirs coincident with findings of elevated concentrations of selenium in fish tissues. Duke Power Company has modified the ash handling facility to reduce selenium inputs at Belews Lake (Coughlan and Velte 1989).

Only one of these plants, Hyco Lake, was included on the 304(l)(C) list of toxic dischargers. Modification of the ash handling facility is in progress through the phasing out of the ash ponds and installation of a dry facility. These actions are expected to reduce inputs of selenium (J. Storm, North Carolina Department of Environment Management). In Alabama, state officials are increasing monitoring of arsenic, copper, selenium, and zinc from ash ponds (J. Moore, Alabama Department of Environmental Management, personal communication). In South Carolina, all new permits for facilities with ash ponds will require ground water monitoring of priority pollutants (B. Ruitter, South Carolina Department of Health and Environmental Control, personal communication).

Under the Clean Water Act Amendments of 1987, many states are developing numerical water quality standards for metals. Court challenges to Maryland and Delaware

standards for copper have been filed by industries and municipalities. The cases challenge the scientific support for the criteria (which were developed using methods similar to those used by EPA) and the methods for measuring metals in water. These court cases are major issues in these states and have delayed the implementation of ICSs for power plants on the 304(l)(C) list.

As part of its review of water quality standards, North Carolina is examining metal bioavailability and toxicity data to determine the manner in which metals should be measured (J. Storm, North Carolina Department of Environmental Management, personal communication). New North Carolina water quality standards for chromium and lead have been based on the total recoverable method rather than acid soluble method specified in the EPA criteria documents.

Several states (e.g., Kentucky, Georgia) have recorded metal concentrations in small receiving streams that exceed ambient water quality criteria. In one case in Kentucky, a utility has moved its discharge to a larger stream that would provide more dilution. In a second case in Kentucky, biomonitoring indicated chronic toxicity and levels of copper and selenium were suspected. The utility is conducting further biomonitoring tests and a biological survey to determine effects on local species (R. Bruce Scott, Kentucky Division of Water, personal communication). In Georgia, this problem is being addressed by monitoring concentrations in intake and effluent samples to determine whether the concentrations are due to pass-through of ambient levels (M. Creason, Georgia Environmental Protection Division, personal communication). State regulators have mentioned that, as they adopt numeric standards, they may find more facilities with effluents that are out of compliance. Thus, investigations similar to those in Georgia and Kentucky may increase in frequency.

In summary, metals issues involve releases from condenser tubing, cooling tower blowdown, cleaning wastes, and coal and ash sources. Concerns include the identification of sources, comparisons of intake and effluent levels, and implementation of procedures to reduce effluents. The continuing adoption of numerical water quality standards and the implementation of section 304(l) has increased the importance of these issues to state regulators.

### **3.3 MARYLAND ISSUES**

The status of Maryland power plant aquatic toxicity issues relating to nationwide concerns will now be addressed, following the same order as was followed in discussing the survey results.

#### **3.3.1 304(l)(C) List**

The BG&E Brandon Shores and DP&L Vienna plants were included on Maryland's final 304(l)(C) list. As shown in Table 3-5, Brandon Shores was listed because its average effluent copper concentration (from two 24-hour composite samplings) was 46.8  $\mu\text{g}/\text{L}$ , which exceeded the Maryland estuarine copper standard of 6.3  $\mu\text{g}/\text{L}$ . Vienna was listed because its average effluent copper concentration of 170  $\mu\text{g}/\text{L}$  exceeded the Maryland acute and chronic freshwater standards of 18 and 12  $\mu\text{g}/\text{L}$ , respectively (at 100 mg/L hardness).

|                | Intake Water |          |      | Discharge Water |          |      | MD Standard        |                   |
|----------------|--------------|----------|------|-----------------|----------|------|--------------------|-------------------|
|                | Sample 1     | Sample 2 | Mean | Sample 1        | Sample 2 | Mean | Acute              | Chronic           |
| Brandon Shores | 6.4          | 100      | 53.2 | 89.0            | 4.5      | 46.8 | 6.3 <sup>(b)</sup> |                   |
| Vienna         | ---          | ---      | ---  | 110             | 230      | 170  | 18 <sup>(c)</sup>  | 12 <sup>(c)</sup> |

(a) Concentrations in  $\mu\text{g/L}$ ; sample collection dates: Brandon Shores 8/22/88 and 9/12/88; Vienna 8/18/88 and 9/16/88

(b) Estuarine criterion

(c) Hardness-based standard; value is given for 100 mg/L  $\text{CaCO}_3$  water

As part of its comments on the 304(l) listing for Brandon Shores, Baltimore Gas and Electric questioned the accuracy of the results based on expected relationships between intake and discharge concentrations. The outfalls at Brandon Shores and Vienna, for which the facilities are included on the 304(l) list, are discharges of cooling tower blowdown water. Cooling tower blowdown water can contain higher levels of chemicals than are found in intake waters simply from the evaporative loss of water in the cooling tower (Holcombe et al. 1987). One potential explanation for the copper levels at the listed plants would be that intake levels were already elevated and that these levels were concentrated in the cooling tower through evaporative loss of water. Therefore, one would expect that intake waters would have consistently lower concentrations than these effluents.

Intake water concentration data from the summer 1988 data submitted for Brandon Shores were analyzed (Table 3-5). No intake water data were submitted for Vienna. At Brandon Shores, there was considerable variability in the copper concentrations between the first and second samplings in both the intake and discharge waters. Intake samples varied by a factor of 16 while effluent samples varied by a factor of 20 in their copper concentrations. There was no consistent relationship between intake and effluent copper concentrations. In the first sampling, copper concentrations were about 15 times higher in the discharge water vs. the intake water. However, in the second sampling intake water was about 20 times more concentrated than the discharge water.

It is important to note that at many facilities intakes and discharges are located in close proximity so that intake water should not necessarily be viewed as an indication of background concentrations. In estuarine waters, tides may also complicate the relationship between intake and discharge concentrations. In the case of Brandon Shores, the situation is further complicated by the plant's use of discharge canal water from the nearby Wagner power plant as intake water. Thus, it is not possible to use the relationship between intake and discharge copper concentrations from the summer 1988 Brandon Shores data to

characterize the source of the levels that exceed the state standard. The absence of intake water data for Vienna precludes a similar evaluation.

ICSs have not been issued for these plants because of ongoing court cases. In separate suits, Baltimore Gas and Electric (BG&E) and Delmarva Power and Light (DP&L) have challenged sections of Maryland's water quality regulations including the newly proposed copper standards for salt and estuarine waters. The Maryland Department of the Environment (MDE) permit for Vienna was also challenged by DP&L. The new permit for Brandon Shores has not been issued. For both plants, MDE attorneys have advised that the Department should wait until the industry challenge to the water quality regulations has been settled (H. Tablada, MDE, personal communication).

As is the case for the nationwide 304(l)(C) list, concerns about Maryland power plants are focussed on metals in effluents. Corrosion and release of metals from condenser tubing, which is likely to be a contributor to the copper levels responsible for the listing of the Maryland plants (Pinkney et al. 1991), appears to be an important source of metals for many of the plants on the national list.

### **3.3.2 Biocides**

In Maryland, PEPCO is using bromine in trial applications at its Chalk Point plant (M. Knott, Maryland Department of the Environment, personal communication). No permits in the state currently provide for bromine use on a regular basis. If Maryland plants were to petition to use bromine on a regular basis, MDE would be faced with many of the same concerns (e.g., the need to have adequate toxicity data to set discharge limits) that have been considered in Region V.

A concern Maryland shares with states with estuarine plants is the need for some plants to use continuous low level chlorination to control macroinvertebrate fouling. Maryland utilities have performed studies of the effectiveness of intermittent vs. continuous chlorination. Studies at Chalk Point indicated that intermittent chlorination was not effective during the peak fouling season (PEPCO 1987). In 1990 and 1991, intermittent chlorination was reexamined in trials at Chalk Point. Although the results have not been finalized, preliminary indications are that intermittent chlorination alone and intermittent chlorination with the addition of ACTI-BROM® have been effective (E. Krueger, PEPCO, personal communication).

No new issues related to chlorine use have been identified in Maryland. In contrast to many states, MDE uses only discharge limits rather than a combination of discharge limits and numerical water quality standards to regulate chlorine. If a very stringent numerical standard were to be developed, some plants may be required to dechlorinate their effluents to be in compliance.

A discussion of the use of and research on biocides at Maryland power plants is provided in Pinkney (1992).

### **3.3.3 Biomonitoring**

Maryland falls into the camp of states that are incorporating biomonitoring into the regulation of power plants by requiring testing and placing whole effluent toxicity limits into permits. Currently, the new permits for Brandon Shores and Vienna require biomonitoring. Maryland is adding biomonitoring requirements on a plant by plant basis after considering the results of screening tests and effluent data (M. Knott, MDE, personal communication). Twenty eight other states have at least one power plant with biomonitoring requirements in its permit.

Acute toxicity tests with Maryland power plant effluents have not indicated toxicity to date. Previous tests have been with samples collected when plants were not chlorinating. Samples collected during chlorination periods that contain high levels of TRC would be dechlorinated prior to testing (M. Knott, MDE, personal communication), since the objective is to screen for toxicity from components other than chlorine. No tests have been reported with samples collected during periods of permit noncompliance.

A review of discharge monitoring reports from several Maryland power plants revealed episodes of noncompliance with permit limits for pH, total residual chlorine, total suspended solids, and oil and grease. The reports usually state that no impacts on receiving streams were observed or expected. The performance of biomonitoring tests with samples collected during periods of noncompliance may serve as a method for monitoring potential effects of these releases. Biomonitoring may also be appropriate for monitoring the potential effects of pulsed releases of other effluents such as boiler wastes, runoff from coal and ash piles, and discharges from ash ponds.

### **3.4.4 Chemical Additives and Cleaning Wastes**

Maryland utilities must provide toxicity data before being given approval for the use of cooling tower additives. Some power plants are required to perform acute screening bioassays of the effluent containing the additives at the time of permit application. Permits specify concentrations and utilities must petition to change these concentrations (M. Knott, MDE, personal communication).

Metal cleaning wastes are generally treated at the facilities, which are required to monitor internal waste streams. Effluent limits are usually established for copper, iron, and occasionally other metals (M. Knott, MDE, personal communication). One permit (Chalk Point) does not allow any discharge of metal cleaning waste water without prior approval from MDE. For other facilities, permits specify which metals are monitored during cleaning periods.

In addition to effluent limitations for these additives and wastes, Maryland uses biomonitoring as a screening procedure to address their possible role in effluent toxicity. This approach is similar to that used in a number of other states. To date, acute toxicity has not been observed in biomonitoring tests with effluents from Maryland power plants.

MDE appears to be using all of the tools (required submission of toxicity data, setting of effluent limits, use of biomonitoring) that are used by other states to avoid effluent toxicity from these additives and wastes.

### **3.4.5 Metals**

The major power plant toxicity issue in Maryland has been the release of copper from the Brandon Shores and Vienna plants at levels exceeding water quality standards and the subsequent industry lawsuit (see 304(l)(C) List). Copper toxicity issues related to Maryland power plants and the use of copper/nickel condenser tubing are discussed in Pinkney et al. (1991). In addition, concern over the handling and possible mobilization of metals from ash pile runoff and ash storage facilities have led to a number of studies (summarized in PPER 1991). At one ash storage facility, some ground water contamination was observed (Price and Keating 1990). However, chemical monitoring and *in situ* bioassays with larval yellow perch did not implicate the facility in reported decreases in local fish populations (Burton et al. 1990).

These concerns associated with metals discharges from Maryland power plants are similar to the problems identified in other states. The two major sources of metals -- plant tubing and coal/ash handling -- have been the subject of PPRP-sponsored research and may warrant continuing investigations.

## 4.0 SUMMARY AND RECOMMENDATIONS

Information on power plants on the 304(l)(C) list has been obtained and summarized. A nationwide survey of EPA regional and state regulators on power plant toxics issues was conducted. The key findings of the nationwide survey are:

- Ten power plants in five states (New Jersey, Delaware, Pennsylvania, Maryland, and North Carolina) were included on the 304(l)(C) list of toxic dischargers. Metals rather than organics were the chemicals responsible for the listings, with copper and nickel (which are found in condenser tubes) most often of concern.
- Bromine use is increasing in a number of states. State regulators are requesting that manufacturers and utilities provide toxicity data on resident species so that effluent limits can be based on toxicity rather than equivalence with chlorine. There are concerns over the use of surfactants in the formulations and the formation of brominated organics in receiving waters.
- Biomonitoring is being implemented in a variety of ways across the nation. In some states, biomonitoring is used as a method of screening effluents for toxicity and monitoring non-priority pollutant compounds that are used as additives and cleaning agents. The use of whole effluent limits in permits is subject to controversy.
- Cleaning wastes and chemical additives are monitored strictly in some states and largely ignored in others. Many states either do not monitor these compounds or only measure them in priority pollutant scans. Other states have set limits based on toxicity data or used biomonitoring tests to screen for toxic impacts.
- Metals can be released from power plants in once-through cooling water, cooling tower blowdown, coal and ash-related wastes, and cleaning wastes. Concerns center around the inclusion of plants on the 304(l)(C) list for metal concentrations, the release of selenium from ash ponds, and the measurement of metal concentrations above ambient water quality criteria in small streams. The implementation of numerical water quality standards has increased the importance of these issues to state regulators.

The issues identified in the nationwide survey may be useful to focus the concerns of Maryland regulators. Issues that need to be investigated include:

- Metals/304(l): Copper concentrations in effluents from several Maryland plants resulted in their inclusion on the 304(l)(C) list. The major sources of power plant effluent copper are its use in tubing and other metal parts that are subject to corrosion and its presence as a trace element in coal and ash. Followup work is needed to derive new estimates of natural and anthropogenic sources of copper in Maryland to quantify loadings to the Chesapeake Bay and estimate the contribution of power plants relative to other sources.

Problems may also exist from metals released from coal and ash handling facilities. In view of the selenium problems in other states, it would be useful for state regulators to collect available selenium concentration data at Maryland ash facilities and determine if any facilities warrant further monitoring.

- **Biocides**: Bromine use is increasing nationwide and is being used in trials at one Maryland plant. There is a need to compile toxicity data on Maryland species and identify gaps in the data base.
- **Biomonitoring**: Maryland's experience has been that power plant effluents have not been acutely toxic. However, no tests have been conducted with effluents collected during periods of permit noncompliance due to spills, pump failures, or runoff. Regulators may need to consider whether requiring such tests would enhance the state's ability to protect resident species from pulsed releases of potentially toxic chemicals.
- **Chemical Additives and Cleaning Wastes**: MDE's permit requirements for additives and cleaning wastes appear to be adequate for avoiding toxic impacts. The requirements for screening bioassays to determine permit limits is well-reasoned and far more protective than procedures in a number of states.

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**APPENDIX**  
**COMPLETED SURVEYS**

**POWER PLANT TOXICS ISSUES QUESTIONNAIRE**  
**Alabama**

1. **NAME, POSITION, AND AGENCY**

James M. Moore III  
ADEM  
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2. **What toxics discharge criteria are applied to power plants?**

Alabama has state water quality standards for priority pollutants. The state water quality standards follow the EPA recommended criteria.

- a. **Is there a statewide chlorine discharge limit? (For example, MD has a limit of 0.2 ppm for power plants and 0.1 ppm for other facilities).**  
Discharge limits are not specifically defined, but the instream concentration must not exceed a maximum of 0.019 mg/l and an average of 0.011 mg/l.
- b. **What is the chlorine standard for ambient waters?**  
EPA criteria: 0.019 mg/l acute; 0.011 mg/l chronic.
- c. **Are any plants dechlorinating to meet the standard?**  
No.
- d. **Are any plants using bromine?**  
No plants use bromine on a routine basis. One power plant is working with the state to develop a bromine standard. The plant currently uses bromine only on a test basis.
- e. **What chemicals are plants typically required to monitor?**  
None. Biomonitoring is used to detect effluent problems. In the case of biomonitoring test failures, a plant is required to identify the responsible pollutant(s).
- f. **How frequently are plants required to perform full priority pollutant scans?**  
Once every five years.

- g. Are plants required to monitor boiler cleaning chemicals?  
Not specifically. Biomonitoring should detect problems with the effluent.
- h. What is the usual frequency for effluent monitoring?  
NA (Not applicable).
- i. Are effluents monitored at the end of the pipe?  
When the effluent is evaluated it can be either at the end of the pipe or in a mixing zone. If samples are taken in a mixing zone certain flow and diffusion requirements must be met.

3. What toxics issues related to power plants are currently of concern to state regulators?

In steam electric plants on water bodies that are controlled by hydroelectric dams, there is concern about levels of heat and toxicants during off peak hours (summer low-flow periods). Ash ponds from these facilities receive cleaning waters (preheater scrub water) as well as ash. Some discharges to reservoirs can occur and these may result in loadings of metals and cleaning chemicals. The state is increasing monitoring requirements for arsenic, selenium, copper, and zinc from the ash ponds. They are also looking at requiring more plants to pretreat these waters. Currently two TVA plants pretreat metal cleaning wastes by adding sodium hydroxide to raise the pH and chelating agents to remove metals from solution.

A second concern is the possible use of bromine, which under tests use at one plant and being considered by others. State officials are interested in obtaining information on the possible formation of brominated organics (e.g., trihalomethanes ) and their possible effects. Several bromine formulations contain surfactants which increase its biocidal action (by allowing bromine more easy penetration of cell membranes). None of these products have been approved for use and they will be watched closely because of their potential toxicity.

- a. Are there any special concerns or research on atmospheric deposition of toxic chemicals from power plants?  
No.
- b. Are any new regulations aimed at power plants under consideration or recently adopted?  
No.
- c. Are there any court cases involving power plant effluents or emissions in progress or recently completed?  
No.

4. How many plants have biomonitoring test requirements in their permits?  
All steam electric facilities have had the biomonitoring requirement in their permits since 1985. The state and the utilities have performed a number of chronic biomonitoring tests. With the exception of one test (which is being repeated), there was no evidence of toxic effects.

- a. Will biomonitoring requirements be added to all new permits?  
Yes, if they do not already have this requirement.
  - b. When are samples collected--during periods of chlorination?  
For coal plants samples are taken from ash ponds. The one nuclear facility which uses chlorine collects composite samples which include periods of chlorination.
  - c. Are grab or composite samples collected?  
24 hour composite samples.
  - d. Will biomonitoring tests require both acute and chronic tests?  
The type of test depends on the volume and diffusion of effluent in the receiving stream. If dilution is  $> 100:1$ , then acute testing is done. If dilution is  $< 100:1$ , then chronic tests are conducted.
5. Which power plants are on the final 304(l) list?  
None.
- a. What toxic compounds were the basis for the listing of each plant?  
NA.
  - b. What are the Individual Control Strategies for the listed plants and have they been implemented?  
NA.
6. Have Toxicity Reduction Evaluations been conducted at any power plants?  
Not yet. Biomonitoring test failures (including failures during accelerated testing) will result in a TRE.
- a. Please describe the major findings.  
NA.

**POWER PLANT TOXICS ISSUES QUESTIONNAIRE**  
**Alaska**

**1. NAME, POSITION, AND AGENCY**

Rob Pedersen  
EPA  
Environmental Services Division  
1200 Sixth Avenue  
Seattle, WA 98101  
206-553-4817

**2. What toxics discharge criteria are applied to power plants?**

- a. Is there a statewide chlorine discharge limit? (For example, MD has a limit of 0.2 ppm for power plants and 0.1 ppm for other facilities).  
Yes.
- b. What is the chlorine standard for ambient waters?  
Generally, the most stringent which is usually the EPA's chronic criteria of 0.011 mg/l at the edge of mixing zone.
- c. Are any plants dechlorinating to meet the standard?  
No.
- d. Are any plants using bromine?  
Not sure, one Idaho facility was looking into bromine vs. chlorine toxicity.
- e. What chemicals are plants typically required to monitor?
- f. How frequently are plants required to perform full priority pollutant scans?  
About once per permit cycle (5 years).
- g. Are plants required to monitor boiler cleaning chemicals?  
No.
- h. What is the usual frequency for effluent monitoring?  
Monthly.
- i. Are effluents monitored at the end of the pipe?  
Yes, end of treatment prior to entering outfall.

**3. What toxics issues related to power plants are currently of concern to state regulators?**

None.

- a. Are there any special concerns or research on atmospheric deposition of toxic chemicals from power plants?  
Not specifically for deposition to water.
  - b. Are any new regulations aimed at power plants under consideration or recently adopted?  
No.
  - c. Are there any court cases involving power plant emissions in progress or recently completed?  
No.
4. How many plants have biomonitoring test requirements in their permits?  
None.
- a. Will biomonitoring requirements be added to all new permits?  
Yes for majors and significant minors.
  - b. When are samples collected--during periods of chlorination?  
NA.
  - c. Are grab or composite samples collected?  
NA.
  - d. Will biomonitoring tests require both acute and chronic tests?  
Yes.
5. Which power plants are on the final 304(l) list?  
None.
- a. What toxic compounds were the basis for the listing of each plant?  
NA.
  - b. What are the Individual Control Strategies for the listed plants and have they been implemented?  
NA.
6. Have Toxicity Reduction Evaluations been conducted at any power plants?  
No.
- a. Please describe the major findings.  
NA.

**POWER PLANT TOXICS ISSUES QUESTIONNAIRE**  
**Arizona**

**1. NAME, POSITION, AND AGENCY**

Wayne Palsma  
NPDES Permit Writer  
Room 202  
Arizona Dept. of Environmental Quality  
2005 North Central Ave  
Phoenix, AZ 85004  
602-257-2270

**2. What toxics discharge criteria are applied to power plants?  
EPA guidelines.**

- a. Is there a statewide chlorine discharge limit? (For example, MD has a limit of 0.2 ppm for power plants and 0.1 ppm for other facilities).  
The EPA BAT limit of 0.2 mg/l.
- b. What is the chlorine standard for ambient waters?  
Arizona has a narrative standard. The daily maximum for chlorine is 0.05 mg/l.
- c. Are any plants dechlorinating to meet the standard?  
No.
- d. Are any plants using bromine?  
No.
- e. What chemicals are plants typically required to monitor?  
The EPA priority pollutants.
- f. How frequently are plants required to perform full priority pollutant scans?  
Once every 5 years, however it may change to once a year in 1991.
- g. Are plants required to monitor boiler cleaning chemicals?  
Yes, if the cleaning chemicals used are toxic to the animals in the receiving waters.
- h. What is the usual frequency for effluent monitoring?  
Normally once a month.
- i. Are effluents monitored at the end of the pipe?  
Yes.

3. What toxics issues related to power plants are currently of concern to state regulators? None at this time.
- a. Are there any special concerns or research on atmospheric deposition of toxic chemicals from power plants?  
NA.
  - b. Are any new regulations aimed at power plants under consideration or recently adopted?  
Every three years the surface water quality standards are updated, but no new regulations are specifically aimed at power plants.
  - c. Are there any court cases involving power plant emissions in progress or recently completed?  
No.
4. How many plants have biomonitoring test requirements in their permits? None.
- a. Will biomonitoring requirements be added to all new permits?  
All major power plants.
  - b. When are samples collected--during periods of chlorination?  
Not sure.
  - c. Are grab or composite samples collected?  
24-hour composite.
  - d. Will biomonitoring tests require both acute and chronic tests? Acute tests will be required and if there is a failure, chronic tests will be conducted.
5. Which power plants are on the final 304(l) list?  
None.
- a. What toxic compounds were the basis for the listing of each plant?  
NA.
  - b. What are the Individual Control Strategies for the listed plants and have they been implemented?  
NA.
6. Have Toxicity Reduction Evaluations been conducted at any power plants? No.
- a. Please describe the major findings.  
NA.

**POWER PLANT TOXICS ISSUES QUESTIONNAIRE**  
**Arkansas**

**1. NAME, POSITION, AND AGENCY**

Mike Core  
Engineering Supervisor  
Arkansas Pollution Control/NPDES Branch  
PO Box 8913  
Little Rock, AR 72219  
(501)562-7444

**2. What toxics discharge criteria are applied to power plants?**

Arkansas follows EPA criteria.

Permits for power plants in Arkansas are derived using a combination of the criteria set forth in 40 CFR Part 423 - Steam Electric Power Generating Point Source Category Effluent Guidelines, Arkansas Water Quality Standards - Regulation No. 2, and the U.S. EPA Third Round Toxics Permitting Strategy.

- a. Is there a statewide chlorine discharge limit? (For example, MD has a limit of 0.2 ppm for power plants and 0.1 ppm for other facilities).  
Currently, there is no numerical standard for chlorine. For major municipal (Q > 1 MGD) facilities, however, ADPCE uses a maximum value of 0.1 mg/l as the analytical detection level for compliance purposes. For industrial facilities, limits would be derived on a case-by-case basis. For power plants the limits would most likely be taken from Section 423.13 (BAT) or Section 412.15 (New Source Performance Standards) as applicable. For further clarification, the applicable limitations would be applied to that particular stream (i.e., once through cooling water or cooling tower blowdown) as an internal outfall; and not on the final outfall.
- b. What is the chlorine standard for ambient waters?  
Same as EPA standard.
- c. Are any plants dechlorinating to meet the standard?  
None known at present.
- d. Are any plants using bromine?  
None known at present.
- e. What chemicals are plants typically required to monitor?
  1. Low Volume Wastewater - TSS, Oil and Grease
  2. Transport Wastewater - TSS, Oil and Grease
  3. Metal Cleaning Wastes - TSS, Oil and Grease, Copper, Iron

4. Once-through cooling water - Total Residual or Free Available Chlorine (case-by-case)
5. Cooling Tower Blowdown - Zinc, Chromium, Priority Pollutants contained in maintenance chemicals.

- f. How frequently are plants required to perform full priority pollutant scans? Currently, maintenance chemicals which contain the priority pollutants are not authorized for discharge. Other maintenance chemicals have been authorized for discharge, and are monitored at the frequency prescribed for conventional parameters.
- g. Are plants required to monitor boiler cleaning chemicals? Boiler cleaning chemicals are not specifically monitored; however, these wastes are limited under metal cleaning wastes guidelines.
- h. What is the usual frequency for effluent monitoring?

Monitoring frequency has usually been established insofar as these plants have been in existence for quite some time. Generally, monitoring frequency remains the same, with the exception of a written request to reduce the frequency. Upon request, reviews are made of compliance files, and in some cases where long-term compliance has been demonstrated; the monitoring frequency may be reduced. New facilities or modified facilities have frequencies established using EPA Region VI guidelines in conjunction with Best Professional Judgement.

- i. Are effluents monitored at the end of the pipe?

In the event that the internal outfalls (previously monitored wastestreams) are commingled, yes there will be limitations for certain parameters placed on the final outfall. These will generally be for parameters that are more stringently controlled by Regulation No. 2 (Arkansas Water Quality Standards). In addition, acute or chronic biomonitoring would be required at this point.

3. What toxics issues related to power plants are currently of concern to state regulators?

None.

- a. Are there any special concerns or research on atmospheric deposition of toxic chemicals from power plants? Atmospheric deposition issues are dealt with through the ADPCE Air Division.

b. Are any new regulations aimed at power plants under consideration or recently adopted?  
I am unaware of any new regulations currently under consideration for power plants by EPA. If, however, regulations are promulgated by EPA, ADPCE will adopt those by reference as described in Regulation No. 6.

c. Are there any court cases involving power plant effluents or emissions in progress or recently completed?  
Currently no court cases exist regarding effluents discharged from power plants.

4. How many plants have biomonitoring test requirements in their permits?  
Seven currently have biomonitoring requirements in their NPDES permits.

a. Will biomonitoring requirements be added to all new permits?  
Biomonitoring requirements will be included in all renewal permits on a case-by-case basis.

b. When are samples collected--during periods of chlorination?  
Biomonitoring is generally required on the commingled wastestreams; and is carried out during what is considered to be normal operations.

c. Are grab or composite samples collected?  
Normally composite samples are required. On a case-by-case basis grab samples may be allowed.

d. Will biomonitoring tests require both acute and chronic tests?  
Chronic biomonitoring is required unless there is a 100:1 dilution; and a minimum 7Q10 of 100 cubic feet per second in the receiving stream.

5. Which power plants are on the final 304(l) list?  
None.

a. What toxic compounds were the basis for the listing of each plant?  
NA.

b. What are the Individual Control Strategies for the listed plants and have they been implemented?  
NA.

6. Have Toxicity Reduction Evaluations been conducted at any power plants?  
No. TRE's will be required in the future if there are failures of a biomonitoring test and subsequent accelerated toxicity test failures.

a. Please describe the major findings.  
NA.

**POWER PLANT TOXICS ISSUES QUESTIONNAIRE**  
**Colorado**

1. **NAME, POSITION, AND AGENCY**

Patricia Nelson  
Industrial Unit Chief  
Colorado Dept. of Health  
Water Quality Division  
4210 East 11th Ave  
Denver, CO 80220  
303-331-4755

2. **What toxics discharge criteria are applied to power plants?**  
EPA guidelines.

- a. **Is there a statewide chlorine discharge limit? (For example, MD has a limit of 0.2 ppm for power plants and 0.1 ppm for other facilities).**  
Not specifically for power plants. There is a state-wide standard of 0.5 ppm.
- b. **What is the chlorine standard for ambient waters?**  
0.003 mg/l acute, there is no chronic standard.
- c. **Are any plants dechlorinating to meet the standard?**  
Not at this time, however plants may be required to dechlorinate if standards are not met.
- d. **Are any plants using bromine?**  
No.
- e. **What chemicals are plants typically required to monitor?**  
The chemicals are plant specific; copper, lead, and zinc are usually monitored.
- f. **How frequently are plants required to perform full priority pollutant scans?**  
A minimum of once every five years, in some cases yearly.
- g. **Are plants required to monitor boiler cleaning chemicals?**  
Not necessarily.
- h. **What is the usual frequency for effluent monitoring?**  
The frequency depends on the plants discharge volume and the class of the receiving waters (daily, weekly, monthly).
- i. **Are effluents monitored at the end of the pipe? Yes.**

3. What toxics issues related to power plants are currently of concern to state regulators? None.
  - a. Are there any special concerns or research on atmospheric deposition of toxic chemicals from power plants? NA.
  - b. Are any new regulations aimed at power plants under consideration or recently adopted? No.
  - c. Are there any court cases involving power plant emissions in progress or recently completed?  
No.
  
4. How many plants have biomonitoring test requirements in their permits? None yet.
  - a. Will biomonitoring requirements be added to all new permits?  
Yes.
  - b. When are samples collected--during periods of chlorination?  
NA.
  - c. Are grab or composite samples collected?  
Grab for acute tests, composite for chronic tests.
  - d. Will biomonitoring tests require both acute and chronic tests? Yes.
  
5. Which power plants are on the final 304(l) list?  
None.
  - a. What toxic compounds were the basis for the listing of each plant?  
NA.
  - b. What are the Individual Control Strategies for the listed plants and have they been implemented?  
NA.
  
6. Have Toxicity Reduction Evaluations been conducted at any power plants?  
NA.
  - a. Please describe the major findings.  
NA.

**POWER PLANT TOXICS ISSUES QUESTIONNAIRE**  
**Connecticut**

**1. NAME, POSITION, AND AGENCY**

Dick Mason  
Supervisor of Sanitation and Engineering  
DEP, Water Management Bureau  
122 Washington Street  
Hartford, CT 06106  
203-566-5903

**2. What toxics discharge criteria are applied to power plants?  
EPA criteria.**

- a. Is there a statewide chlorine discharge limit? (For example, MD has a limit of 0.2 ppm for power plants and 0.1 ppm for other facilities). The state uses the EPA BAT limit of 0.2 mg/l.
- b. What is the chlorine standard for ambient waters?  
Connecticut uses the EPA standards.
- c. Are any plants dechlorinating to meet the standard?  
No.
- d. Are any plants using bromine?  
Yes, some plants are using the commercial product ACTI-BROM® which contains bromine and surfactants.
- e. What chemicals are plants typically required to monitor? pH, oil and grease, and some metals.
- f. How frequently are plants required to perform full priority pollutant scans?  
Once every five years.
- g. Are plants required to monitor boiler cleaning chemicals? Yes.
- h. What is the usual frequency for effluent monitoring?  
Frequency is usually at least monthly, however it is plant specific.
- i. Are effluents monitored at the end of the pipe?  
Yes.

3. What toxics issues related to power plants are currently of concern to state regulators? None at this time.
  - a. Are there any special concerns or research on atmospheric deposition of toxic chemicals from power plants? NA.
  - b. Are any new regulations aimed at power plants under consideration or recently adopted? No.
  - c. Are there any court cases involving power plant emissions in progress or recently completed? No.
4. How many plants have biomonitoring test requirements in their permits? Many.
  - a. Will biomonitoring requirements be added to all new permits? Yes.
  - b. When are samples collected--during periods of chlorination? Samples are collected during periods of chlorination.
  - c. Are grab or composite samples collected?  
Grab samples.
  - d. Will biomonitoring tests require both acute and chronic tests? Only acute tests.
5. Which power plants are on the final 304(l) list?  
None.
  - a. What toxic compounds were the basis for the listing of each plant? NA.
  - b. What are the Individual Control Strategies for the listed plants and have they been implemented? NA.
6. Have Toxicity Reduction Evaluations been conducted at any power plants? No.
  - a. Please describe the major findings. NA.

**POWER PLANT TOXICS ISSUES QUESTIONNAIRE**  
**Delaware**

**1. NAME, POSITION, AND AGENCY**

Paul Janiga  
Environmental Engineer  
Pollution Control Branch  
Surface Water Management Section  
Division of Water Resources  
89 Kings Highway  
PO Box 1401  
Dover, DE 19903  
302-739-5731

**2. What toxics discharge criteria are applied to power plants?**  
EPA criteria.

- a. Is there a statewide chlorine discharge limit? (For example, MD has a limit of 0.2 ppm for power plants and 0.1 ppm for other facilities). Delaware uses the EPA BAT limit of 0.2 mg/l.
- b. What is the chlorine standard for ambient waters?  
The chlorine standard is 0.011 mg/l chronic for freshwater and 0.0075 mg/l chronic for saline water. Delaware does not have an acute standard.
- c. Are any plants dechlorinating to meet the standard?  
No.
- d. Are any plants using bromine?  
No.
- e. What chemicals are plants typically required to monitor? Chlorine, flow, pH, and temperature.
- f. How frequently are plants required to perform full priority pollutant scans?  
Once every five years.
- g. Are plants required to monitor boiler cleaning chemicals? Currently, no plants are monitoring cleaning chemicals.
- h. What is the usual frequency for effluent monitoring?  
Frequency depends on the size of the plant and the type of discharge (e.g., flow and temperature are monitored hourly, and pH monthly).

- i. Are effluents monitored at the end of the pipe?  
Usually effluents are monitored at the end of the pipe, however sometimes samples may be collected directly at the source (e.g. at the turbines).

3. What toxics issues related to power plants are currently of concern to state regulators?

Thermal impacts and metal toxicity are major issues that concern Delaware regulators.

The metal toxicity issue centers around the inclusion of the Indian River plant on the 304 (I) list for copper and the challenge of Delaware's copper standard of 2.9  $\mu\text{g/L}$  for saline waters by 19 groups (industries and municipalities). Currently Delaware grants what is known as an intake credit which provides an exemption from surface water quality criteria if it can be shown that effluent concentrations. DP&L argued that the 304 (I) listing was due to intake waters and challenged both ICS (which called for permit modifications reducing copper discharges) and the copper standard (along with the 18 other groups). The position of the state is that the concentrations at Indian River are largely attributable to the recirculation of power plant effluents. The source of elevated copper is the use of copper-containing condenser tubes. This plant is the only major facility in the area. According to Mr. Janiga, an out of court settlement is likely to be reached in several months which will retain the 2.9  $\mu\text{g/L}$  standard but change some of the language in the standards (details not available at this time).

- a. Are there any special concerns or research on atmospheric deposition of toxic chemicals from power plants? NA.
- b. Are any new regulations aimed at power plants under consideration or recently adopted? No.
- c. Are there any court cases involving power plant emissions in progress or recently completed? See #3

4. How many plants have biomonitoring test requirements in their permits? Two plants have biomonitoring test requirements in their permits.

- a. Will biomonitoring requirements be added to all new permits? No.
- b. When are samples collected--during periods of chlorination? Not sure.
- c. Are grab or composite samples collected?  
Composite samples.
- d. Will biomonitoring tests require both acute and chronic tests? Yes.

5. Which power plants are on the final 304(l) list?  
One power plant (Delaware Power and Light at Indian River).
- a. What toxic compounds were the basis for the listing of each plant? Copper concentrations in the intake and effluent were approximately 50  $\mu\text{g/L}$ . According to the EPA Region III 304(l) decision document, this is an estuarine system with recirculation of the effluent into the intake waters.
  - b. What are the Individual Control Strategies for the listed plants and have they been implemented? The ICS calls for increased monitoring of copper in order to provide a mass balance and reduction of the effluent concentrations to meet the 2.9  $\mu\text{g/L}$  standard. The new permit limit is scheduled to take effect 4 June 1992, but has been challenged in court (see # 3).
6. Have Toxicity Reduction Evaluations been conducted at any power plants? No.
- a. Please describe the major findings. NA.

**POWER PLANT TOXICS ISSUES QUESTIONNAIRE**  
**Florida**

**1. NAME POSITION, AND AGENCY**

Jan Nandrup-Poulson  
Florida DER, Water Regulation  
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Tallahassee, FL 32399-2400  
904-488-4520  
FAX 904-487-3618

**2. What toxics discharge criteria are applied to power plants?**

Combination of EPA and state guidelines.

- a. Is there a statewide chlorine discharge limit? (For example, MD has a limit of 0.2 ppm for power plants and 0.1 ppm for other facilities).  
No, limit may vary between districts.
- b. What is the chlorine standard for ambient waters?  
0.01 ppm acute measured at end of pipe; 0.03 ppm acute and 0.04 ppm chronic for mixing zones.
- c. Are any plants dechlorinating to meet the standard?  
Plants are not required to dechlorinate specifically, however it may be necessary for compliance.
- d. Are any plants using bromine?  
Currently no plants are using bromine as a biocide.
- e. What chemicals are plants typically required to monitor? Plants are required to monitor EPA priority pollutants.
- f. How frequently are plants required to perform full priority pollutant scans?  
Plants are under both state and federal permits. Plants in operation prior to 1972 were on a five year cycle for state permits as well as federal permits. Plants operating since 1972 were given lifetime state permits but have 5 year federal permits. Generally, all plants would be required to have full priority pollutant scans every 5 years for federal permit renewal.
- g. Are plants required to monitor boiler cleaning chemicals?  
State asks for any available characterization data for cleaning chemicals. these can range from information on expected concentrations in the discharge, concentrations and comparisons to bioassay results. For example, one plant will be required to document that the maximum

discharge of a hydrazine formulation is not toxic to test species (mysid shrimp and inland silverside) in toxicity tests.

- h. What is the usual frequency for effluent monitoring?  
Frequency follows EPA guidelines; can vary depending on the type of pollutant being monitored (continuous, quarterly, monthly).
- i. Are effluents monitored at the end of the pipe?  
Yes.

3. What toxics issues related to power plants are currently of concern to state regulators?

The major issue regards chlorine discharges from multi-unit plants. EPA's BAT limit is for 0.2 ppm on a two hour discharge. However, if many facilities are discharging consecutively, the discharge would be as much as 12 hours of 0.2 ppm. To avoid discharging at this rate, the state required these plants to meet the 0.01 ppm and 0.03-0.04 ppm ambient water quality standards. However, some plants are in the process of gathering data to show whether there is a level between 0.04 and 0.2 ppm which can be safely discharged by multi-unit plants.

A second issue is the use of ground water for power plant cooling waters. Rather than use Florida's limited potable ground water as a source, plants are exploring the use of non-potable aquifers which are cleaned-up by reverse osmosis (RO). However, the problem is the discharge of the RO brine water which the state will not permit in freshwater systems.

Metal cleaning wastes are a concern. Lined and unlined ponds are used to contain these waters. Typically the only discharges are to ground water (from unlined ponds) and in 25-year storms (where there would be plenty of dilution). However, some plants have small discharges during checks of the integrity of the weirs. The concern is that metals are concentrated in these ponds because of evaporative losses and from inputs from rainwater. Metals of concern are cadmium, chromium, copper, lead, and mercury. Sources include condenser tube corrosion (primarily copper), boiler chemicals (primarily chromium), and atmospheric inputs (other metals).

Low volume wastes are of concern when they are directly discharged to receiving waters. Permits are including chemical and biomonitoring for these discharges.

- a. Are there any special concerns or research on atmospheric deposition of toxic chemicals from power plants? No. (Buck Owen, Air Division)
- b. Are any new regulations aimed at power plants under consideration or recently adopted? No.

- c. Are there any court cases involving power plant emissions in progress or recently completed?  
No.
- 4. How many plants have biomonitoring test requirements in their permits? Many plants.
  - a. Will biomonitoring requirements be added to all new permits? Yes.
  - b. When are samples collected--during periods of chlorination? If testing for chlorine, then samples are collected during the 2 hour chlorination period.
  - c. Are grab or composite samples collected?  
Grab samples are collected for power plants.
  - d. Will biomonitoring tests require both acute and chronic tests?  
This depends on the dilution. If dilution is greater than 100:1, then only acute tests would be required. For dilution ratios less than this, chronic tests would be required.
- 5. Which power plants are on the final 304(l) list? None
  - a. What toxic compounds were the basis for the listing of each plant? NA.
  - b. What are the Individual Control Strategies for the listed plants and have they been implemented? NA.
- 6. Have Toxicity Reduction Evaluations been conducted at any power plants? No.
  - a. Please describe the major findings. NA.

**POWER PLANT TOXICS ISSUES QUESTIONNAIRE**  
**Georgia**

**1. NAME POSITION, AND AGENCY**

Mike Creason  
Georgia Environmental Protection Division  
Industrial Waste Water Program  
205 Butler St. SE  
Floyd Tower East, Suite 1070  
Atlanta, GA 30334  
(404)656-4887

**2. What toxics discharge criteria are applied to power plants?**  
Georgia standards follow EPA criteria.

- a. Is there a statewide chlorine discharge limit? (For example, MD has a limit of 0.2 ppm for power plants and 0.1 ppm for other facilities).  
Same as EPA standard (BAT limit = 0.2 ppm)
- b. What is the chlorine standard for ambient waters?  
No numerical water quality standard.
- c. Are any plants dechlorinating to meet the standard?  
None known.
- d. Are any plants using bromine?  
None known.
- e. What chemicals are plants typically required to monitor?  
Plants monitor priority pollutants specified in their permit. Specified pollutants are those shown to be in the effluent.
- f. How frequently are plants required to perform full priority pollutant scans?  
With each application for permit reissuance - typically every five years.
- g. Are plants required to monitor boiler cleaning chemicals?  
Not specifically. Plants monitor chemicals specified in their permits which may include chemicals contained in cleaning compounds.
- h. What is the usual frequency for effluent monitoring?  
Determined on a case-by-case basis.
- i. Are effluents monitored at the end of the pipe?  
In some cases. Effluent guidelines also require monitoring of some individual waste streams.

3. What toxics issues related to power plants are currently of concern to state regulators?

Metal concentrations in 2-3 power plant effluents have exceeded freshwater ambient water quality criteria. Exceedances are evaluating these data and are comparing levels in intakes with levels in effluents. State water quality criteria allow intake credits in situations where plants are simply passing through and not increasing levels of pollutants.

Power plant issues usually involve metals.

a. Are there any special concerns or research on atmospheric deposition of toxic chemicals from power plants? No.

b. Are any new regulations aimed at power plants under consideration or recently adopted?

No, but the entire permitting system and instream standards are being revised.

c. Are there any court cases involving power plant effluents or emissions in progress or recently completed?

No.

4. How many plants have biomonitoring test requirements in their permits?

None. Testing would be required if a toxicity problem is suspected at a specific site.

a. Will biomonitoring requirements be added to all new permits?

No routine monitoring will be required, but testing must be done if requested by the state.

b. When are samples collected--during periods of chlorination?

No.

c. Are grab or composite samples collected?

Composite.

d. Will biomonitoring tests require both acute and chronic tests?

Both will probably be required in the future.

5. Which power plants are on the final 304(l) list?

None, but a few have metals in their effluent at concentrations exceeding ambient water quality criteria. No more facilities will be added to 304(l) list, but some could have compliance problems.

a. What toxic compounds were the basis for the listing of each plant?

NA

b. What are the Individual Control Strategies for the listed plants and have they been implemented?  
NA

6. Have Toxicity Reduction Evaluations been conducted at any power plants?  
No.

a. Please describe the major findings.  
NA

**POWER PLANT TOXICS ISSUES QUESTIONNAIRE**  
**Hawaii**

**1. NAME POSITION, AND AGENCY**

Edward Chen  
Environmental Engineer  
State of Hawaii, Department of Health  
Honolulu, HI 96813  
808-543-8309

**2. What toxics discharge criteria are applied to power plants?**

- a. Is there a statewide chlorine discharge limit? (For example, MD has a limit of 0.2 ppm for power plants and 0.1 ppm for other facilities).  
BAT
- b. What is the chlorine standard for ambient waters?  
Hawaii has adopted the EPA criteria numbers for chlorine.
- c. Are any plants dechlorinating to meet the standard?  
No.
- d. Are any plants using bromine?  
No.
- e. What chemicals are plants typically required to monitor?  
Total Residual Oxidant (TRO).
- f. How frequently are plants required to perform full priority pollutant scans?  
During each NPDES permit renewal application.
- g. Are plants required to monitor boiler cleaning chemicals?  
No. Metal cleaning waste is allowed to be discharged from most of the plants. When metal cleaning waste is discarded, levels of total copper and total iron must be monitored in the waste stream prior to mixing with non-contact cooling water.
- h. What is the usual frequency for effluent monitoring?  
Weekly effluent monitoring for TRO and monthly for the remaining parameter.
- i. Are effluents monitored at the end of the pipe?  
Yes.

3. What toxics issues related to power plants are currently of concern to state regulators? Although dependant on the fuel, the State is not concerned with any specific toxic air emissions.
  - a. Are there any special concerns or research on atmospheric deposition of toxic chemicals from power plants? None, at this time.
  - b. Are any new regulations aimed at power plants under consideration or recently adopted? Coal burning rules and the associated criteria pollutants have been under consideration for some time.
  - c. Are there any court cases involving power plant emissions in progress or recently completed? No.
  
4. How many plants have biomonitoring test requirements in their permits? 5
  - a. Will biomonitoring requirements be added to all new permits? Yes
  - b. When are samples collected--during periods of chlorination?  
During periods of cooling water chlorination
  - c. Are grab or composite samples collected? Grab
  - d. Will biomonitoring tests require both acute and chronic tests? Chronic for submerged outfall, and acute for surface discharge.
  
5. Which power plants are on the final 304(l) list? None
  - a. What toxic compounds were the basis for the listing of each plant?  
NA
  - b. What are the Individual Control Strategies for the listed plants and have they been implemented? NA
  
6. Have Toxicity Reduction Evaluations been conducted at any power plants?  
None.

**POWER PLANT TOXICS ISSUES QUESTIONNAIRE**  
**Idaho**

**1. NAME, POSITION, AND AGENCY**

Rob Pedersen  
EPA  
Environmental Services Division  
1200 Sixth Avenue  
Seattle, WA 98101  
206-553-4817

**2. What toxics discharge criteria are applied to power plants?**

- a. Is there a statewide chlorine discharge limit? (For example, MD has a limit of 0.2 ppm for power plants and 0.1 ppm for other facilities). Yes
- b. What is the chlorine standard for ambient waters?  
Generally, the most stringent which is usually the EPA's chlorine criteria of 0.011 mg/l at the edge of mixing zone.
- c. Are any plants dechlorinating to meet the standard?  
No.
- d. Are any plants using bromine?  
Not sure. One Idaho facility was looking into bromine vs. chlorine toxicity.
- e. What chemicals are plants typically required to monitor?
- f. How frequently are plants required to perform full priority pollutant scans?  
About once per permit cycle (5 years).
- g. Are plants required to monitor boiler cleaning chemicals?  
No.
- h. What is the usual frequency for effluent monitoring?  
Monthly.
- i. Are effluents monitored at the end of the pipe?  
Yes, end of treatment prior to entering outfall.

3. What toxics issues related to power plants are currently of concern to state regulators? None.
  - a. Are there any special concerns or research on atmospheric deposition of toxic chemicals from power plants?  
Not specifically for deposition to water.
  - b. Are any new regulations aimed at power plants under consideration or recently adopted?  
No.
  - c. Are there any court cases involving power plant emissions in progress or recently completed?  
No.
  
4. How many plants have biomonitoring test requirements in their permits?  
None.
  - a. Will biomonitoring requirements be added to all new permits?  
Yes for majors and significant minors.
  - b. When are samples collected--during periods of chlorination?  
NA.
  - c. Are grab or composite samples collected?  
NA.
  - d. Will biomonitoring tests require both acute and chronic tests?  
Yes.
  
5. Which power plants are on the final 304(l) list?
  - a. What toxic compounds were the basis for the listing of each plant?  
NA.
  - b. What are the Individual Control Strategies for the listed plants and have they been implemented?  
NA.
  
6. Have Toxicity Reduction Evaluations been conducted at any power plants?  
No.
  - a. Please describe the major findings.  
NA.

**POWER PLANT TOXICS ISSUES QUESTIONNAIRE**  
**Illinois**

**1. NAME POSITION, AND AGENCY**

Tim Kluge  
Industrial Unit Manager  
EPA, Division of Pollution and Water Control  
PO Box 19276  
Springfield, IL 62794-9276  
217-282-0610

**2. What toxics discharge criteria are applied to power plants?**  
Combination of EPA and state criteria.

- a. Is there a statewide chlorine discharge limit? (For example, MD has a limit of 0.2 ppm for power plants and 0.1 ppm for other facilities). The state adopted an intermittent discharge chlorine standard of 0.2 mg/l average and 0.5 mg/l maximum but it has not yet been approved by EPA.
- b. What is the chlorine standard for ambient waters?  
EPA criteria: 0.019 mg/l acute, 0.011 mg/l chronic.
- c. Are any plants dechlorinating to meet the standard?  
No.
- d. Are any plants using bromine?  
Yes, 7 or 8 plants are using bromine in combination with chlorine.
- e. What chemicals are plants typically required to monitor? Chemicals limited in the EPA BAT guidelines.
- f. How frequently are plants required to perform full priority pollutant scans?  
Once every 5 years.
- g. Are plants required to monitor boiler cleaning chemicals? Yes, it depends on operating practice and type of chemicals being used (e.g., hydrazine).
- h. What is the usual frequency for effluent monitoring?  
Twice a month for most plants.
- i. Are effluents monitored at the end of the pipe?  
Yes, but at some plants samples are collected at an internal stream before the effluent combines with the cooling water.

3. What toxics issues related to power plants are currently of concern to state regulators? Bromine, state is concerned about its toxicity relative to chlorine. The State is working with EPA Region V in trying to obtain valid toxicity data from the manufacturers.
  - a. Are there any special concerns or research on atmospheric deposition of toxic chemicals from power plants? NA.
  - b. Are any new regulations aimed at power plants under consideration or recently adopted? The intermittent discharge chlorine standards.
  - c. Are there any court cases involving power plant emissions in progress or recently completed? Several permit appeals in progress; disagreements with water quality standards.
4. How many plants have biomonitoring test requirements in their permits? None, however some have had biomonitoring conducted as part of their application process.
  - a. Will biomonitoring requirements be added to all new permits? No, unless through some connection with the bromine issue.
  - b. When are samples collected--during periods of chlorination? Yes, during periods of chlorination.
  - c. Are grab or composite samples collected? Grab samples.
  - d. Will biomonitoring tests require both acute and chronic tests? Acute only.
5. Which power plants are on the final 304(l) list?  
None.
  - a. What toxic compounds were the basis for the listing of each plant? NA.
  - b. What are the Individual Control Strategies for the listed plants and have they been implemented? NA.
6. Have Toxicity Reduction Evaluations been conducted at any power plants? No.
  - a. Please describe the major findings. NA.

**POWER PLANT TOXICS ISSUES QUESTIONNAIRE**  
**Indiana**

**1. NAME POSITION, AND AGENCY**

Lonnie Brumfield, Chief  
Permits Section  
IDEM  
105 South Meridian Street  
PO Box 6015  
Indianapolis, IN 46206-6015  
317-232-8705

**2. What toxics discharge criteria are applied to power plants?  
EPA guidelines.**

- a. Is there a statewide chlorine discharge limit? (For example, MD has a limit of 0.2 ppm for power plants and 0.1 ppm for other facilities). Indiana uses the EPA BAT limit of 0.2 mg/l.
- b. What is the chlorine standard for ambient waters?  
Indiana follows the EPA guidelines.
- c. Are any plants dechlorinating to meet the standard?  
No.
- d. Are any plants using bromine?  
Some plants may be testing it.
- e. What chemicals are plants typically required to monitor? The chemicals listed in the EPA BAT guidelines.
- f. How frequently are plants required to perform full priority pollutant scans?  
Once every 5 years for permit renewal.
- g. Are plants required to monitor boiler cleaning chemicals? Yes, they must meet the specified EPA limits.
- h. What is the usual frequency for effluent monitoring?  
Frequency varies depending on size of the power plant; majors are usually required to monitor daily.
- i. Are effluents monitored at the end of the pipe?  
Samples are collected at a point that is representative of the discharge effluent (usually at the end of the pipe).

3. What toxics issues related to power plants are currently of concern to state regulators? Bromine is a major issue. Indiana is working in conjunction with EPA Region V to obtain toxicity data from the manufacturers of bromine.
  - a. Are there any special concerns or research on atmospheric deposition of toxic chemicals from power plants? NA.
  - b. Are any new regulations aimed at power plants under consideration or recently adopted? No.
  - c. Are there any court cases involving power plant emissions in progress or recently completed? No.
4. How many plants have biomonitoring test requirements in their permits? Some plants have biomonitoring test requirements in their permits.
  - a. Will biomonitoring requirements be added to all new permits? Probably most of the new permits will have biomonitoring requirements, however this will be determined on a case by case basis.
  - b. When are samples collected--during periods of chlorination? The samples are dechlorinated before biomonitoring tests are applied, therefore it really doesn't matter when the samples are collected.
  - c. Are grab or composite samples collected? Either sampling method may be used.
  - d. Will biomonitoring tests require both acute and chronic tests? The biomonitoring tests are 7 day chronic tests, however acute data can be obtained from those tests.
5. Which power plants are on the final 304(l) list?  
None.
  - a. What toxic compounds were the basis for the listing of each plant? NA.
  - b. What are the Individual Control Strategies for the listed plants and have they been implemented? NA.
6. Have Toxicity Reduction Evaluations been conducted at any power plants? No.
  - a. Please describe the major findings. NA.

**POWER PLANT TOXICS ISSUES QUESTIONNAIRE**  
**Iowa**

**1. NAME, POSITION, AND AGENCY**

Steve Willams  
Iowa DNR  
Environmental Protection Division  
900 East Grand  
Des Moines, IA 50319  
515-281-8884

**2. What toxics discharge criteria are applied to power plants?**

A combination of EPA and state guidelines are used.

- a. Is there a statewide chlorine discharge limit? (For example, MD has a limit of 0.2 ppm for power plants and 0.1 ppm for other facilities). The EPA standard of BAT 0.2 mg/l is used for power plants unless a more stringent limit is required to meet water quality standards.
- b. What is the chlorine standard for ambient waters?  
The standard for total residual chlorine is 0.02 mg/l chronic and 0.035 mg/l acute.
- c. Are any plants dechlorinating to meet the standard?  
No.
- d. Are any plants using bromine?  
Several plants have been using a combination of chlorine and bromine for the past two years.
- e. What chemicals are plants typically required to monitor? Plants are required to monitor total suspended solids, oil and grease, chlorine, pH, flow rate, copper, and iron.
- f. How frequently are plants required to perform full priority pollutant scans?  
Once every 5 years for permit renewal.
- g. Are plants required to monitor boiler cleaning chemicals? No.
- h. What is the usual frequency for effluent monitoring?  
Frequency depends on the pollutant being monitored (e.g., chlorine is weekly, flow and pH are daily).

- i. Are effluents monitored at the end of the pipe?  
Generally effluents are monitored at the end of the pipe with 2 exceptions; 1) plants with cooling tower blowdown where the samples are collected directly from the tower discharge and 2) domestic sewage discharges that are monitored inside the plant.
3. What toxics issues related to power plants are currently of concern to state regulators? None at this time.
- a. Are there any special concerns or research on atmospheric deposition of toxic chemicals from power plants? NA.
  - b. Are any new regulations aimed at power plants under consideration or recently adopted? Iowa is revising their water quality standards and reclassifying their streams. The effluent standards for power plants will probably be more stringent.
  - c. Are there any court cases involving power plant emissions in progress or recently completed? No.
4. How many plants have biomonitoring test requirements in their permits? None.
- a. Will biomonitoring requirements be added to all new permits? All major power plants will have biomonitoring requirements in their permits. Requirements for smaller plants will be determined on a case by case basis.
  - b. When are samples collected--during periods of chlorination? NA.
  - c. Are grab or composite samples collected?  
NA.
  - d. Will biomonitoring tests require both acute and chronic tests? Not know at this time.
5. Which power plants are on the final 304(l) list?  
None.
- a. What toxic compounds were the basis for the listing of each plant? NA.
  - b. What are the Individual Control Strategies for the listed plants and have they been implemented?  
NA.
6. Have Toxicity Reduction Evaluations been conducted at any power plants? NA.
- a. Please describe the major findings. NA.

**POWER PLANT TOXICS ISSUES QUESTIONNAIRE**  
**Kansas**

1. **NAME, POSITION, AND AGENCY**  
Don Carlson  
Chief of Industrial Program Section  
Bureau of Water  
Kansas Dept of Health and Environment  
Building 740 Forbes Field  
Topeka, KS 66620  
913-296-5547
  
2. **What toxics discharge criteria are applied to power plants?**  
Follows EPA guidelines. Other chemicals addressed case-by-case based on water quality criteria requirements.
  - a. **Is there a statewide chlorine discharge limit? (For example, MD has a limit of 0.2 ppm for power plants and 0.1 ppm for other facilities). Kansas uses the BAT limit of 0.2 mg/l (Daily Average) and 0.5 mg/l for a daily maximum per EPA effluent criteria.**
  
  - b. **What is the chlorine standard for ambient waters?**  
Kansas uses a narrative standard. "There shall be no detectable concentration of total residual chlorine in surface waters."
  
  - c. **Are any plants dechlorinating to meet the standard?**  
No.
  
  - d. **Are any plants using bromine?**  
Yes, one plant.
  
  - e. **What chemicals are plants typically required to monitor? Total suspended solids, chloride, copper, iron sulfates, oil and grease, pH, chlorine (free available), temperature.**
  
  - f. **How frequently are plants required to perform full priority pollutant scans?**  
No full priority pollutant scans required; if plant believes chemical is present then effluent will be analyzed for that specific chemical.
  
  - g. **Are plants required to monitor boiler cleaning chemicals? Yes, are grouped with "metal cleaning waste" monitoring per EPA effluent criteria. Adjusted per water quality considerations.**
  
  - h. **What is the usual frequency for effluent monitoring?**  
Typically monthly monitoring is required, however; it is site specific; (for example, weekly on peak power plant operation).

- i. Are effluents monitored at the end of the pipe?  
Yes, but for some plants that have boiler blowdown as cooling systems, samples are collected at the blowdown discharge point.
  
- 3. What toxics issues related to power plants are currently of concern to state regulators? Regulators are requiring plant operators to submit all available data on boiler additives used during plant operations. If the department cannot judge safe effluent concentrations, they request toxicity data from manufacturers.
  - a. Are there any special concerns or research on atmospheric deposition of toxic chemicals from power plants? No research conducted to date. Atmospheric deposition has not been considered an issue.
  - b. Are any new regulations aimed at power plants under consideration or recently adopted? No.
  - c. Are there any court cases involving power plant emissions in progress or recently completed?  
No.
  
- 4. How many plants have biomonitoring test requirements in their permits? None. Biomonitoring is not a high priority. Screening tests have not identified toxicity problems.
  - a. Will biomonitoring requirements be added to all new permits? Not known at this time.
  - b. When are samples collected--during periods of chlorination? NA.
  - c. Are grab or composite samples collected?  
NA.
  - d. Will biomonitoring tests require both acute and chronic tests? NA.
  
- 5. Which power plants are on the final 304(l) list?  
None.
  - a. What toxic compounds were the basis for the listing of each plant? NA.
  - b. What are the Individual Control Strategies for the listed plants and have they been implemented?  
NA.
  
- 6. Have Toxicity Reduction Evaluations been conducted at any power plants? NA.
  - a. Please describe the major findings. NA.

**POWER PLANT TOXICS ISSUES QUESTIONNAIRE**  
**Kentucky**

1. **NAME, POSITION, AND AGENCY**

R. Bruce Scott  
Environmental Engineer  
Kentucky Division of Water  
KPDES Branch  
18 Reilly Rd.  
Frankfort, KY 40601  
(502)564-3410

2. **What toxics discharge criteria are applied to power plants?**  
Kentucky follows EPA standards for state criteria.

- a. **Is there a statewide chlorine discharge limit? (For example, MD has a limit of 0.2 ppm for power plants and 0.1 ppm for other facilities).**  
Same as EPA standard (BAT limit = 0.2 ppm). Also, discharge must meet water quality standards (Acute = 0.019 mg/l, chronic = 0.011 mg/l). Most discharge limits end up being 0.019 mg/l or less.
- b. **What is the chlorine standard for ambient waters?**  
Same as EPA criteria. (Acute = 0.019 mg/l; chronic = 0.011 mg/l)
- c. **Are any plants dechlorinating to meet the standard?**  
None dechlorinate, but some plants dilute effluent in holding ponds. Several plants do not use chlorine.
- d. **Are any plants using bromine?**  
About half of the 22 plants are using bromine. Kentucky currently allows a discharge level of 0.2 ppm TRO. Bromine is indirectly monitored through toxicity testing. I would like EPA to develop ambient water quality criterion for bromine since so many facilities are now switching to it from chlorine.
- e. **What chemicals are plants typically required to monitor?**  
Power plant standards follow the EPA standards for the steam electric point source category. Plants are required to monitor priority pollutants. Main plant discharges and/or ash ponds have water quality limits for heavy metals.
- f. **How frequently are plants required to perform full priority pollutant scans?**  
Plants do three scans during five-year period in addition to routine monitoring.

- g. Are plants required to monitor boiler cleaning chemicals?  
All cleaning operations are monitored if discharged ultimately to a water of the state.
  - h. What is the usual frequency for effluent monitoring?  
Monitoring frequency depends on effluent volume, type of discharge and pollutant. Priority pollutants monitored once per month; cleaning compounds monitored when used. Conventional pollutants (TSS, O&G, pH, etc.) monitored one/week, one/day.
  - i. Are effluents monitored at the end of the pipe?  
Monitoring is essentially done by sampling the effluent. In cases where samples are taken from a mixing zone, the limits are established for low-flow conditions. This effectively requires monitoring to be done at the end of the pipe.
3. What toxics issues related to power plants are currently of concern to state regulators? PCBs are monitored at all plants. Plants are allowed zero discharge. Although no problems have been identified, transformers containing PCBs are still in use.

There are concerns about metal releases from power plants. Biomonitoring tests revealed chronic toxicity at two plants that discharge into smaller streams. Metal scans indicated that toxicity may have been associated with discharges of copper (from both tubing and ash releases) and selenium (from ash). One plant has moved its discharge to a larger stream. The second plant is undergoing further biomonitoring tests and performing a biosurvey with the goal of showing a lack of instream effects.

Monitoring of the two plants that discharge into reservoirs have not found levels of selenium that would raise concerns.

- a. Are there any special concerns or research on atmospheric deposition of toxic chemicals from power plants?  
Not required as part of permit, although pH violations of stormwater runoff can occur due to acidic rainfall.
- b. Are any new regulations aimed at power plants under consideration or recently adopted?  
No.
- c. Are there any court cases involving power plant effluents or emissions in progress or recently completed?  
One plant is not yet in court but is fighting the state's decision to use the 1974 NSPS regulation instead of the 1984 BAT regulation. EPA is handling the case which has been unresolved for five years.

4. How many plants have biomonitoring test requirements in their permits?  
One plant currently has this requirement.
- a. Will biomonitoring requirements be added to all new permits?  
Yes. It is an important part of Kentucky's approach.
  - b. When are samples collected--during periods of chlorination?  
Samples are dechlorinated before testing.
  - c. Are grab or composite samples collected?  
Four grabs will be taken and analyzed separately. Composites will not be allowed. After some period of time (e.g. 1 year) a single grab may be acceptable if previous tests indicate consistency among grabs.
  - d. Will biomonitoring tests require both acute and chronic tests?  
Test method (i.e., acute or chronic) will be determined based on water quality concern. Only one test type is generally used in establishing test requirements and limitations.
5. Which power plants are on the final 304(l) list?  
None are currently on the list, but all Kentucky power plants would be if the state adopted the EPA arsenic criteria for the  $10^{-6}$  cancer risk level. [EPA human health criterion for this risk level is 22 ng/l.]
- a. What toxic compounds were the basis for the listing of each plant?  
NA
  - b. What are the Individual Control Strategies for the listed plants and have they been implemented?  
NA
6. Have Toxicity Reduction Evaluations been conducted at any power plants?  
Not officially, but two plants with chronic metal problems are working with the state to resolve the problem. Discharge will probably be moved to a larger stream to meet ambient water quality criteria. One other plant is pursuing an exception to criteria or other alternative limitations in order to meet heavy metal water quality limitations.
- a. Please describe the major findings. See above.

**POWER PLANT TOXICS ISSUES QUESTIONNAIRE**  
**Maine**

**1. NAME, POSITION, AND AGENCY**

Mickey Kuhns  
Division Director  
Division of Enforcement and Permits  
State House Station 17  
Augusta, ME 04333  
207-289-3901

**2. What toxics discharge criteria are applied to power plants?  
EPA guidelines.**

- a. Is there a statewide chlorine discharge limit? (For example, MD has a limit of 0.2 ppm for power plants and 0.1 ppm for other facilities). EPA BAT standard of 0.2 mg/l.
- b. What is the chlorine standard for ambient waters?  
EPA criteria; 0.019 mg/l acute, 0.011 mg/l chronic.
- c. Are any plants dechlorinating to meet the standard?  
No.
- d. Are any plants using bromine?  
Probably none, but not certain without consulting files.
- e. What chemicals are plants typically required to monitor? Heat, flow, chlorine, and pH.
- f. How frequently are plants required to perform full priority pollutant scans?  
Once every 5 years for permit renewal.
- g. Are plants required to monitor boiler cleaning chemicals? No.
- h. What is the usual frequency for effluent monitoring?  
Usually continuous monitoring for environmentally sensitive receiving waters.
- i. Are effluents monitored at the end of the pipe?  
Yes, but samples may also be collected at other discharge points where the effluent has undergone treatment (cooling).

3. What toxics issues related to power plants are currently of concern to state regulators? None at this time.
  - a. Are there any special concerns or research on atmospheric deposition of toxic chemicals from power plants? NA.
  - b. Are any new regulations aimed at power plants under consideration or recently adopted? No.
  - c. Are there any court cases involving power plant emissions in progress or recently completed? No.
4. How many plants have biomonitoring test requirements in their permits? One.
  - a. Will biomonitoring requirements be added to all new permits? Yes.
  - b. When are samples collected--during periods of chlorination? Samples are collected during worst case discharges (ie. periods of chlorination).
  - c. Are grab or composite samples collected? Usually composited.
  - d. Will biomonitoring tests require both acute and chronic tests? Yes.
5. Which power plants are on the final 304(l) list? None.
  - a. What toxic compounds were the basis for the listing of each plant? NA.
  - b. What are the Individual Control Strategies for the listed plants and have they been implemented? NA.
6. Have Toxicity Reduction Evaluations been conducted at any power plants? No.
  - a. Please describe the major findings. NA.

**POWER PLANT TOXICS ISSUES QUESTIONNAIRE**  
**Maryland**

**1. NAME, POSITION, AND AGENCY**

Mr. Melvin Knott, Chief  
Compliance and Biomonitoring Division  
Maryland Department of the Environment  
2500 Broening Highway  
Baltimore, MD 21224  
301-631-3323

**2. What toxics discharge criteria are applied to power plants?**

- a. **Is there a statewide chlorine discharge limit?**  
MD has a discharge limit of 0.2 ppm for power plants and less than 0.1 ppm for other facilities.
- b. **What is the chlorine standard for ambient waters?**  
None; Maryland law prohibits the discharge of chlorinated waters except as provided in the regulations.
- c. **Are any plants dechlorinating to meet the standard?**  
No.
- d. **Are any plants using bromine?**  
Apparently some trials have been conducted at PEPCO's Chalk Point plant.
- e. **What chemicals are plants typically required to monitor?**  
Varies with the plant. Generally, pH, TSS, oil and grease, and total residual chlorine. Metals frequently monitored are copper, iron, and manganese.
- f. **How frequently are plants required to perform full priority pollutant scans?**  
Every five years for NPDES permit application.
- g. **Are plants required to monitor boiler cleaning chemicals?**  
Metals cleaning wastes are generally treated at the facilities. Internal streams are monitored. Effluent limits usually apply to copper, iron, and occasionally other metals. Manufacturers must supply toxicity data before being given approval for the use of cooling tower additives. Some industries are required to perform acute screening bioassays of the effluent containing the additives at the time of permit application. Permits specify concentrations and utilities must petition to change these concentrations.

- h. **What is the usual frequency for effluent monitoring?**  
Varies with the chemical. Chlorine is monitored daily during chlorination periods.
  - i. **Are effluents monitored at the end of the pipe?**  
Yes; significant internal streams are also assigned internal monitoring points.
3. **What toxics issues related to power plants are currently of concern to state regulators?**  
304(l) listing of plants and industry challenge of copper standards
- a. **Are there any special concerns or research on atmospheric deposition of toxic chemicals from power plants?**  
A screening study was performed to compare levels of mercury and arsenic in fish, sediments, and the water column in ponds in the vicinity of and removed from coal-fired power plants. Several years ago, concentrations of contaminants in the surface microlayer were measured in the Bay and at several locations near power plants.
  - b. **Are any new regulations aimed at power plants under consideration or recently adopted?**  
Thermal regulations were revised in 1990.
  - c. **Are there any court cases involving power plant emissions in progress recently completed?**  
Baltimore Gas and Electric and several other industries have challenged the applicability of the State's new copper standards for ambient waters. Copper levels were the reason for the listing of two plants on the 304(l) list. This case is in progress.
4. **How many plants have biomonitoring test requirements in their permits?**
- a. **Will biomonitoring requirements be added to all new permits?**  
Several permits currently have biomonitoring requirements. Future requirements will be evaluated on a case by case basis. MDE will evaluate the results of biomonitoring tests performed at the state's laboratory and by the power companies over the past several years.
  - b. **When are samples collected--during periods of chlorination?**  
In the past samples for biomonitoring have not been collected during periods of chlorination. Biomonitoring tests are intended to evaluate potential toxicity from other components of the effluent rather than chlorine (which is known to be toxic but is controlled through effluent discharge limits).
  - c. **Are grab or composite samples collected?**  
Most samples have been grabs, although some, including those collected for PEPCO's Chalk Point chronic tests have been composites.

- d. Will biomonitoring tests require both acute and chronic tests?  
Permit biomonitoring requirements will be on a case-by case basis. Most tests have been acute tests. PEPCO-Chalk Pt. is currently running a series of chronic tests on their main cooling canal discharge.
- 5. Which power plants are on the final 304(l) list?  
Brandon Shores (BG&E)  
Vienna (DP&L)
  - a. What toxic compounds were the basis for the listing of each plant?  
Both listed for copper
  - b. What are the Individual Control Strategies for the listed plants and have they been implemented?  
Permit modifications with copper limits were proposed. The permits have not been issued because of lawsuit against the State.
- 6. Have Toxicity Reduction Evaluations been conducted at any power plants?  
No, none have been necessary.
  - a. Please describe the major findings.  
NA.

**POWER PLANT TOXICS ISSUES QUESTIONNAIRE  
Massachusetts**

**1. NAME, POSITION, AND AGENCY**

Sal Resurreccion  
Department of Environmental Protection  
Industrial Water Management Section  
1 Winter St.  
Boston, MA 02108  
617-292-5665

**2. What toxics discharge criteria are applied to power plants?  
Marine dischargers follow EPA guidelines in 316 (a) and (b).**

- a. Is there a statewide chlorine discharge limit? (For example, MD has a limit of 0.2 ppm for power plants and 0.1 ppm for other facilities).  
Massachusetts discharge limit is 0.1 ppm.
- b. What is the chlorine standard for ambient waters?  
0.1 ppm.
- c. Are any plants dechlorinating to meet the standard?  
None known.
- d. Are any plants using bromine?  
None known.
- e. What chemicals are plants typically required to monitor?  
Conventional pollutants (oil and grease, TSS, etc.), chlorine, and temperature.
- f. How frequently are plants required to perform full priority pollutant scans?  
Quarterly for the first year, once or twice in succeeding years if no problems have been detected.
- g. Are plants required to monitor boiler cleaning chemicals?  
Yes.
- h. What is the usual frequency for effluent monitoring?  
Oil and grease, and TSS are monitored once per month. Temperature is monitored with hourly grab samples. Iron, nickel, and zinc are monitored twice per month. Other pollutants monitored as specified in the permit.
- i. Are effluents monitored at the end of the pipe?  
Yes.

3. What toxics issues related to power plants are currently of concern to state regulators?  
Chlorine.
- a. Are there any special concerns or research on atmospheric deposition of toxic chemicals from power plants?  
NA
  - b. Are any new regulations aimed at power plants under consideration or recently adopted?  
No.
  - c. Are there any court cases involving power plant effluents or emissions in progress or recently completed?  
None known.
4. How many plants have biomonitoring test requirements in their permits?  
Some have biomonitoring requirements (exact number not known). Most of the major permit holders have biomonitoring requirements now, and all major dischargers will have them in future permits. Small dischargers have biomonitoring requirements if specified in their permits.
- a. Will biomonitoring requirements be added to all new permits?  
Only to permits of major dischargers.
  - b. When are samples collected--during periods of chlorination?  
Composite samples are collected and may include samples from periods of chlorination.
  - c. Are grab or composite samples collected?  
Composite.
  - d. Will biomonitoring tests require both acute and chronic tests?  
Yes.
5. Which power plants are on the final 304(l) list?  
None.
- a. What toxic compounds were the basis for the listing of each plant?  
NA
  - b. What are the Individual Control Strategies for the listed plants and have they been implemented?  
NA.

6. Have Toxicity Reduction Evaluations been conducted at any power plants?  
No.

a. Please describe the major findings.  
NA.

**POWER PLANT TOXICS ISSUES QUESTIONNAIRE**  
**Michigan**

**1. NAME, POSITION, AND AGENCY**

Gary Boersen  
Chief of Consumer Commodities Permit Unit  
Michigan DNR/Surface Water Quality Division  
Box 30028  
Lansing, MI 48909  
(517) 335-4114

- 2. What toxics discharge criteria are applied to power plants?**  
Michigan follows EPA guidelines for steam electric point source category and state water quality standards.
- a. **Is there a statewide chlorine discharge limit? (For example, MD has a limit of 0.2 ppm for power plants and 0.1 ppm for other facilities). 0.036 mg/l limit for continuous discharge (zebra mussel problems). 0.2 mg/l average discharge limit for normal 120 min. chlorination periods with a spike of up to 0.3 mg/l allowed during this period.**
  - b. **What is the chlorine standard for ambient waters?**  
0.036 mg/l.
  - c. **Are any plants dechlorinating to meet the standard?**  
No, but there is a provision to require it if necessary. Continuous chlorine dischargers will probably be required to dechlorinate.
  - d. **Are any plants using bromine?**  
No, but it has been proposed as a method to control the zebra mussel.
  - e. **What chemicals are plants typically required to monitor?**  
Coal piles and ash ponds are monitored initially to characterize the runoff. If a problem is indicated, usually metals, the plant monitors that pollutant.
  - f. **How frequently are plants required to perform full priority pollutant scans?**  
Once every 5 years.
  - g. **Are plants required to monitor boiler cleaning chemicals?**  
A calculated effluent level is determined based on flow and amount of cleaner used. If the effluent concentration is determined to be too high, a limit is established and the plant must monitor to comply with the limit. Monitoring is determined on a case-by-case basis.



b. What are the Individual Control Strategies for the listed plants and have they been implemented?  
NA

6. Have Toxicity Reduction Evaluations been conducted at any power plants?  
NA

a. Please describe the major findings.  
NA

**POWER PLANT TOXICS ISSUES QUESTIONNAIRE**  
**Minnesota**

1. NAME, POSITION, AND AGENCY

Terry Mader  
Minnesota Pollution Control Agency  
Water Quality Division/Industrial Section  
520 Lafayette Rd. North  
St. Paul, MN 55155  
(612) 296-7236

2. What toxics discharge criteria are applied to power plants?

- a. Is there a statewide chlorine discharge limit? (For example, MD has a limit of 0.2 ppm for power plants and 0.1 ppm for other facilities).  
0.2 ppm for up to 2 hrs/day
- b. What is the chlorine standard for ambient waters?  
(?)
- c. Are any plants dechlorinating to meet the standard?  
None known.
- d. Are any plants using bromine?  
Yes.
- e. What chemicals are plants typically required to monitor?  
Chlorine, bromine, and some metals (case dependent)
- f. How frequently are plants required to perform full priority pollutant scans?  
Every five years (with every permit renewal).
- g. Are plants required to monitor boiler cleaning chemicals?  
Yes.
- h. What is the usual frequency for effluent monitoring?  
Major power plants monitor effluents on a daily basis.
- i. Are effluents monitored at the end of the pipe?  
Yes, in most cases.

3. What toxics issues related to power plants are currently of concern to state regulators?  
Bromine.

- a. Are there any special concerns or research on atmospheric deposition of toxic chemicals from power plants?  
NA
  - b. Are any new regulations aimed at power plants under consideration or recently adopted?  
No.
  - c. Are there any court cases involving power plant effluents or emissions in progress or recently completed?  
No.
4. How many plants have biomonitoring test requirements in their permits?  
None, but toxicity data is being collected for bromine.
- a. Will biomonitoring requirements be added to all new permits?  
No.
  - b. When are samples collected--during periods of chlorination?  
Samples are collected during periods of bromination and chlorination for purposes of developing a toxicity data base for bromine.
  - c. Are grab or composite samples collected?  
Grab.
  - d. Will biomonitoring tests require both acute and chronic tests?  
Neither is required yet.
5. Which power plants are on the final 304(l) list?  
None.
- a. What toxic compounds were the basis for the listing of each plant?  
NA
  - b. What are the Individual Control Strategies for the listed plants and have they been implemented?  
NA
6. Have Toxicity Reduction Evaluations been conducted at any power plants? No.
- a. Please describe the major findings.  
NA

**POWER PLANT TOXICS ISSUES QUESTIONNAIRE**  
**Mississippi**

**1. NAME, POSITION, AND AGENCY**

Larry Hamil  
Project Engineer  
State Office of Pollution Control  
PO Box 10385  
Jackson, MS 39289-0385  
601-961-5123

**2. What toxics discharge criteria are applied to power plants?  
EPA guidelines.**

- a. Is there a statewide chlorine discharge limit? (For example, MD has a limit of 0.2 ppm for power plants and 0.1 ppm for other facilities). The state uses the EPA BAT limit of 0.2 mg/l. Mississippi would use the water quality criteria for chlorine at any sources using chlorine which were discharging into any state water that do not have a flow rate great enough to provide adequate dilution.
- b. What is the chlorine standard for ambient waters?  
They have adopted the EPA standards: 0.019 mg/l acute, 0.011 mg/l chronic.
- c. Are any plants dechlorinating to meet the standard? No.
- d. Are any plants using bromine? No.
- e. What chemicals are plants typically required to monitor? The chemicals listed in the EPA's categorical standards unless other chemicals are detected during the priority pollutant scan.
- f. How frequently are plants required to perform full priority pollutant scans?  
Once every 5 years for permit renewal.
- g. Are plants required to monitor boiler cleaning chemicals? Only if they register above the water quality standards in the priority pollutant scan.
- h. What is the usual frequency for effluent monitoring?  
Frequency is parameter specific; chlorine is daily, other parameters are not more than once a week.

- i. Are effluents monitored at the end of the pipe?  
Samples are collected at a discharge point after the effluent has gone through the final stages of treatment and before it mixes with state waters.
3. What toxics issues related to power plants are currently of concern to state regulators?  
None at this time.
  - a. Are there any special concerns or research on atmospheric deposition of toxic chemicals from power plants? NA.
  - b. Are any new regulations aimed at power plants under consideration or recently adopted? No.
  - c. Are there any court cases involving power plant emissions in progress or recently completed? No.
4. How many plants have biomonitoring test requirements in their permits? One plant. In the one instance identified, biomonitoring was included as a condition to the 301(g) variance granted to the facility by EPA for chlorine.
  - a. Will biomonitoring requirements be added to all new permits? Possibly, not sure at this time.
  - b. When are samples collected--during periods of chlorination? During the 2 hour chlorination period.
  - c. Are grab or composite samples collected? Grabs are used for pollutants such as pH, oil and grease, chlorine, and bacteria. Composites are required otherwise.
  - d. Will biomonitoring tests require both acute and chronic tests? Acute only.
5. Which power plants are on the final 304(l) list? None.
  - a. What toxic compounds were the basis for the listing of each plant? NA.
  - b. What are the Individual Control Strategies for the listed plants and have they been implemented? NA.
6. Have Toxicity Reduction Evaluations been conducted at any power plants? No.
  - a. Please describe the major findings. NA.

**POWER PLANT TOXICS ISSUES QUESTIONNAIRE**  
**Missouri**

**1. NAME, POSITION, AND AGENCY**

Richard Laux  
Missouri DNR  
Wasterwater Pollution Control  
PO Box 176  
Jefferson City, MO 65102  
314-751-6825

**2. What toxics discharge criteria are applied to power plants?**

Generally follow EPA guidelines.

- a. Is there a statewide chlorine discharge limit? (For example, MD has a limit of 0.2 ppm for power plants and 0.1 ppm for other facilities).  
The state uses EPA BAT limit of 0.2 mg/l.
- b. What is the chlorine standard for ambient waters?  
Standard is site specific depending on the stream class; 0.01 mg/l for warm water fisheries, 0.002 mg/l for cold water fisheries.
- c. Are any plants dechlorinating to meet the standard?  
No.
- d. Are any plants using bromine?  
None at this time, however some plants have expressed interest in trying it.
- e. What chemicals are plants typically required to monitor? It depends on the ash pond analysis, and other waste streams, generally several metals are monitored (e.g., copper, iron, nickel).
- f. How frequently are plants required to perform full priority pollutant scans?  
Once every 5 years for permit renewal.
- g. Are plants required to monitor boiler cleaning chemicals? Yes.
- h. What is the usual frequency for effluent monitoring?  
The frequency is site specific depending on effluent flow rate. Major power plants with high flow rates are usually required to monitor temperature and pH daily; suspended solids and oil and grease weekly; and metals monthly.
- i. Are effluents monitored at the end of the pipe?  
Generally effluents are monitored at the end of the pipe.

3. What toxics issues related to power plants are currently of concern to state regulators? The inclusion of whole effluent toxicity screens and tests in power plant permits.
  - a. Are there any special concerns or research on atmospheric deposition of toxic chemicals from power plants? NA.
  - b. Are any new regulations aimed at power plants under consideration or recently adopted? Biomonitoring is under consideration.
  - c. Are there any court cases involving power plant emissions in progress or recently completed?  
None.
4. How many plants have biomonitoring test requirements in their permits? None.
  - a. Will biomonitoring requirements be added to all new permits? Possibly some new permits, however not known at this time.
  - b. When are samples collected--during periods of chlorination? NA.
  - c. Are grab or composite samples collected? NA.
  - d. Will biomonitoring tests require both acute and chronic tests? NA.
5. Which power plants are on the final 304(l) list?  
None.
  - a. What toxic compounds were the basis for the listing of each plant? NA.
  - b. What are the Individual Control Strategies for the listed plants and have they been implemented? NA.
6. Have Toxicity Reduction Evaluations been conducted at any power plants? NA.
  - a. Please describe the major findings. NA.

**POWER PLANT TOXICS ISSUES QUESTIONNAIRE**  
**Montana**

**1. NAME, POSITION, AND AGENCY**

Fred Shewman  
Supervisor of Permit Section  
Montana DHES  
Water Quality Bureau  
Capital Station  
Helena, MT 59620  
406-444-2406

**2. What toxics discharge criteria are applied to power plants?**  
Montana uses EPA criteria.

- a. Is there a statewide chlorine discharge limit? (For example, MD has a limit of 0.2 ppm for power plants and 0.1 ppm for other facilities). The state uses the EPA BAT limit of 0.2 mg/l.
- b. What is the chlorine standard for ambient waters?  
The EPA criteria are used.
- c. Are any plants dechlorinating to meet the standard?  
No.
- d. Are any plants using bromine?  
No.
- e. What chemicals are plants typically required to monitor? Total residual chlorine, temperature, flow, pH, oil and grease, and total suspended solids.
- f. How frequently are plants required to perform full priority pollutant scans?  
Once every five years.
- g. Are plants required to monitor boiler cleaning chemicals? No.
- h. What is the usual frequency for effluent monitoring?  
Frequency depends on the parameter that is being monitored (e.g., chlorine is daily, flow and temperature is weekly).
- i. Are effluents monitored at the end of the pipe?  
Yes.

3. What toxics issues related to power plants are currently of concern to state regulators? None.
  - a. Are there any special concerns or research on atmospheric deposition of toxic chemicals from power plants? NA.
  - b. Are any new regulations aimed at power plants under consideration or recently adopted? No.
  - c. Are there any court cases involving power plant emissions in progress or recently completed? No.
  
4. How many plants have biomonitoring test requirements in their permits? All plants with discharges other than cooling water.
  - a. Will biomonitoring requirements be added to all new permits? Yes, if other than non-contact cooling discharges.
  - b. When are samples collected--during periods of chlorination? Samples are not collected during periods of chlorination.
  - c. Are grab or composite samples collected?  
Composite.
  - d. Will biomonitoring tests require both acute and chronic tests? Acute only.
  
5. Which power plants are on the final 304(l) list?  
None.
  - a. What toxic compounds were the basis for the listing of each plant? NA.
  - b. What are the Individual Control Strategies for the listed plants and have they been implemented? NA.
  
6. Have Toxicity Reduction Evaluations been conducted at any power plants? No.
  - a. Please describe the major findings. NA.

**POWER PLANT TOXICS ISSUES QUESTIONNAIRE**  
**Nebraska**

**1. NAME, POSITION, AND AGENCY**

Bill Gidley  
Supervisor  
Permits and Compliance Section  
PO Box 98922  
Lincoln, NE 68509  
402-471-4209

**2. What toxics discharge criteria are applied to power plants?  
EPA guidelines.**

- a. Is there a statewide chlorine discharge limit? (For example, MD has a limit of 0.2 ppm for power plants and 0.1 ppm for other facilities). The standard is BAT 0.2 mg/l.
- b. What is the chlorine standard for ambient waters?  
Will send copy of chlorine standards.
- c. Are any plants dechlorinating to meet the standard?  
No.
- d. Are any plants using bromine?  
No.
- e. What chemicals are plants typically required to monitor? All categoricals in EPA BAT guidelines.
- f. How frequently are plants required to perform full priority pollutant scans?  
Once every 5 years?
- g. Are plants required to monitor boiler cleaning chemicals? No. Hydrazine was tested and showed no adverse impacts to aquatic fauna in receiving waters.
- h. What is the usual frequency for effluent monitoring?  
Varies depending on plant size (flow rate); daily/weekly/monthly.
- i. Are effluents monitored at the end of the pipe?  
Yes.

3. What toxics issues related to power plants are currently of concern to state regulators? None.
  - a. Are there any special concerns or research on atmospheric deposition of toxic chemicals from power plants? NA.
  - b. Are any new regulations aimed at power plants under consideration or recently adopted? New mixing zone regulations were developed for surface water quality standards.
  - c. Are there any court cases involving power plant emissions in progress or recently completed? No.
4. How many plants have biomonitoring test requirements in their permits? Some plants have biomonitoring requirements; requirements are site specific and depend on results of 24 hour acute toxicity screening test. If 10% mortality results in screening test then biomonitoring plan is implemented.
  - a. Will biomonitoring requirements be added to all new permits? It depends on screening test results.
  - b. When are samples collected--during periods of chlorination? Yes.
  - c. Are grab or composite samples collected? 24-hour composite samples.
  - d. Will biomonitoring tests require both acute and chronic tests? Just acute; however, chronic tests are possible in the future.
5. Which power plants are on the final 304(l) list? None.
  - a. What toxic compounds were the basis for the listing of each plant? NA.
  - b. What are the Individual Control Strategies for the listed plants and have they been implemented? NA.
6. Have Toxicity Reduction Evaluations been conducted at any power plants? No.
  - a. Please describe the major findings. NA.

**POWER PLANT TOXICS ISSUES QUESTIONNAIRE**  
**Nevada**

1. **NAME, POSITION, AND AGENCY**

Richard Reavis  
Chief of Bureau of Water Permits and Compliance  
Nevada DEP  
123 West Nye Lane  
Carson City, NV 89710  
702-687-4670

2. **What toxics discharge criteria are applied to power plants?**  
EPA guidelines.

- a. **Is there a statewide chlorine discharge limit? (For example, MD has a limit of 0.2 ppm for power plants and 0.1 ppm for other facilities). Power plants in Nevada do not discharge into surface waters, the effluent is contained in ponds. Regulations require that cooling water must be totally contained and that it cannot degrade the quality of the ground water. Receiving ponds must have double liners and a leak detection system installed.**
- b. **What is the chlorine standard for ambient waters?**  
NA.
- c. **Are any plants dechlorinating to meet the standard?**  
NA.
- d. **Are any plants using bromine?**  
NA.
- e. **What chemicals are plants typically required to monitor?**  
NA.
- f. **How frequently are plants required to perform full priority pollutant scans?**  
NA.
- g. **Are plants required to monitor boiler cleaning chemicals?**  
NA.
- h. **What is the usual frequency for effluent monitoring?**  
NA.
- i. **Are effluents monitored at the end of the pipe?**  
NA.

3. What toxics issues related to power plants are currently of concern to state regulators? None at this time.
  - a. Are there any special concerns or research on atmospheric deposition of toxic chemicals from power plants? NA.
  - b. Are any new regulations aimed at power plants under consideration or recently adopted? No.
  - c. Are there any court cases involving power plant emissions in progress or recently completed? No.
  
4. How many plants have biomonitoring test requirements in their permits? NA.
  - a. Will biomonitoring requirements be added to all new permits? NA.
  - b. When are samples collected--during periods of chlorination? NA.
  - c. Are grab or composite samples collected?  
NA.
  - d. Will biomonitoring tests require both acute and chronic tests? NA.
  
5. Which power plants are on the final 304(l) list?  
None.
  - a. What toxic compounds were the basis for the listing of each plant? NA.
  - b. What are the Individual Control Strategies for the listed plants and have they been implemented? NA.
  
6. Have Toxicity Reduction Evaluations been conducted at any power plants? No.
  - a. Please describe the major findings. NA.

**POWER PLANT TOXICS ISSUES QUESTIONNAIRE**  
**New Hampshire**

**1. NAME, POSITION, AND AGENCY**

Jeff Andrews  
Supervisor of Industrial Permits Section  
Dept. of Environmental Services  
Waste Water Supply and Pollution Control Division  
PO Box 95  
6 Hazen Drive  
Concord, NH 03301  
603-271-2457

**2. What toxics discharge criteria are applied to power plants?**

The EPA criteria.

- a. Is there a statewide chlorine discharge limit? (For example, MD has a limit of 0.2 ppm for power plants and 0.1 ppm for other facilities). The state uses the EPA BAT limit of 0.2 mg/l.
- b. What is the chlorine standard for ambient waters?  
The state uses the EPA guidelines.
- c. Are any plants dechlorinating to meet the standard?  
No.
- d. Are any plants using bromine?  
No.
- e. What chemicals are plants typically required to monitor? The chemicals are plant-specific (e.g., chlorine, total residual oxidants, iron, suspended solids).
- f. How frequently are plants required to perform full priority pollutant scans?  
Once every 5 years.
- g. Are plants required to monitor boiler cleaning chemicals? Yes, the dose limit is determined from toxicity data associated with each chemical.
- h. What is the usual frequency for effluent monitoring?  
At least once a month.
- i. Are effluents monitored at the end of the pipe?  
Yes.

3. What toxics issues related to power plants are currently of concern to state regulators?  
We have screened discharge to freshwater for acute toxicity and have found none. We do not have in-house capability to perform tests using marine organisms. This information would be valuable as most of our power plants discharge to coastal waters.
- a. Are there any special concerns or research on atmospheric deposition of toxic chemicals from power plants? NA.
  - b. Are any new regulations aimed at power plants under consideration or recently adopted? No.
  - c. Are there any court cases involving power plant emissions in progress or recently completed? No.
4. How many plants have biomonitoring test requirements in their permits? None.
- a. Will biomonitoring requirements be added to all new permits? Yes.
  - b. When are samples collected--during periods of chlorination?  
Representative samples would be required in permit.
  - c. Are grab or composite samples collected?  
Grabs. Composite samples.
  - d. Will biomonitoring tests require both acute and chronic tests? It depends on the dilution ratio; acute tests for high dilution, chronic tests for low dilution.
5. Which power plants are on the final 304(l) list?  
None.
- a. What toxic compounds were the basis for the listing of each plant? NA.
  - b. What are the Individual Control Strategies for the listed plants and have they been implemented? NA.
6. Have Toxicity Reduction Evaluations been conducted at any power plants? No.
- a. Please describe the major findings. NA.

**POWER PLANT TOXICS ISSUES QUESTIONNAIRE**  
**New Mexico**

1. **NAME, POSITION, AND AGENCY**

Mike Saladen  
Water Resource Specialist II  
New Mexico Environmental Improvement Division  
Surface Water Section  
1190 St. Francis Dr.  
Santa Fe, NM 87503  
(505)827-2798

2. **What toxics discharge criteria are applied to power plants?**  
New Mexico uses EPA criteria.

- a. **Is there a statewide chlorine discharge limit? (For example, MD has a limit of 0.2 ppm for power plants and 0.1 ppm for other facilities).  
EPA standard (.001mg/l), based on WQCC of no toxics.  
[EPA BAT = 0.2 ppm]. Limits that are under consideration are 0.010 mg/l for discharges to receiving streams with no attainable uses, and 0.004 mg/l for receiving streams classified as coldwater fisheries. The current limitation is non-detectable (0.001 mg/l).**
- b. **What is the chlorine standard for ambient waters?  
EPA AWQC.**
- c. **Are any plants dechlorinating to meet the standard?  
None currently dechlorinate, but dechlorination would be required when the permit is renewed or is required if this is a new point source.**
- d. **Are any plants using bromine?  
Yes.**
- e. **What chemicals are plants typically required to monitor?  
EPA priority pollutants if detected in effluent. In addition, the power plants must meet Code of Federal Register (40 CFR) requirements, if applicable.**
- f. **How frequently are plants required to perform full priority pollutant scans?  
  
The permittee would be required to perform a full priority pollutant scan when the permit comes up for renewal (e.g., once every five years), or upon processing of a permit application, if it is a new point source discharge. Additionally, if priority pollutants are entrained in the wastestream, then the permittee would be/may be required to test for that specific constituent on a more frequent basis.**



- c. Are grab or composite samples collected?  
The type of sample collected is based on the amount of flow from the facility.
  - d. Will biomonitoring tests require both acute and chronic tests?  
This is conducted on a case by case basis.
5. Which power plants are on the final 304(l) list?  
None.
- a. What toxic compounds were the basis for the listing of each plant?  
NA
  - b. What are the Individual Control Strategies for the listed plants and have they been implemented?  
NA
6. Have Toxicity Reduction Evaluations been conducted at any power plants?  
TRE's have not yet been conducted but will be required after third round permit renewals in the event of biomonitoring test failures (including retests).
- a. Please describe the major findings.  
NA

**POWER PLANT TOXICS ISSUES QUESTIONNAIRE**  
**New York**

**1. NAME, POSITION, AND AGENCY**

Paul Kolakowski  
Division Director  
Division of Water  
Room 318  
New York State DEC  
50 Wolf Road  
Albany, NY 12233-3505  
518-457-1157

**2. What toxics discharge criteria are applied to power plants?**  
Combination of EPA and State guidelines.

- a. Is there a statewide chlorine discharge limit? (For example, MD has a limit of 0.2 ppm for power plants and 0.1 ppm for other facilities). New York uses EPA BAT limit of 0.2 mg/l.
- b. What is the chlorine standard for ambient waters?  
For freshwater; 5 ppb chronic (class A,B,C waters), 19 ppb acute (class D waters). For saline waters; 7.5 ppb chronic (class A,B,C waters), 13 ppb acute (class D waters).
- c. Are any plants dechlorinating to meet the standard?  
No.
- d. Are any plants using bromine?  
Not at this time, although some plants are considering its use to prevent fouling by the zebra mussel. If any plants begin using bromine, it will be regulated as a total oxidant using the total residual chlorine limit.
- e. What chemicals are plants typically required to monitor? Mainly the EPA priority pollutants.
- f. How frequently are plants required to perform full priority pollutant scans?  
Once every 5 years for permit renewal.
- g. Are plants required to monitor boiler cleaning chemicals? Yes, if a plant decides to use a toxic cleaning chemical, it must monitor for that chemical.
- h. What is the usual frequency for effluent monitoring?  
At least monthly, it depends on the parameter being monitored.

- i. Are effluents monitored at the end of the pipe?  
Yes.
3. What toxics issues related to power plants are currently of concern to state regulators? None at this time.
- a. Are there any special concerns or research on atmospheric deposition of toxic chemicals from power plants? NA.
  - b. Are any new regulations aimed at power plants under consideration or recently adopted? The state is in the process of updating the water quality standards for chlorine.
  - c. Are there any court cases involving power plant emissions in progress or recently completed?  
Yes, proposed fluidized bed coal burning.
4. How many plants have biomonitoring test requirements in their permits? A few.
- a. Will biomonitoring requirements be added to all new permits? At least one permit, however it will not be necessary for all the permits to contain biomonitoring requirements.
  - b. When are samples collected--during periods of chlorination? Samples are collected after periods of chlorination and dechlorination.
  - c. Are grab or composite samples collected?  
24 hour composite.
  - d. Will biomonitoring tests require both acute and chronic tests? Biomonitoring will be initiated with acute tests, if failure occurs then a chronic test will be applied.
5. Which power plants are on the final 304(I) list?  
None. Eleven plants were initially listed because New York DEC included all major discharges to the lower Hudson/New York Harbor area. Once effluent data were reviewed, all were removed from the 304 (I) list.
- a. What toxic compounds were the basis for the listing of each plant?
  - b. What are the Individual Control Strategies for the listed plants and have they been implemented? NA
6. Have Toxicity Reduction Evaluations been conducted at any power plants? No.
- a. Please describe the major findings. NA.

**POWER PLANT TOXICS ISSUES QUESTIONNAIRE**  
**North Carolina**

1. **NAME, POSITION, AND AGENCY**

Dale Overcash/Julia Storm  
Division of Environmental Management  
PO Box 27687  
Raleigh, NC 27611  
(919)733-5083

2. **What toxics discharge criteria are applied to power plants?**

North Carolina follows the federal guidelines. Discharge limits for a specific power plant are determined on case-by-case basis. Effects of priority pollutants on the receiving stream are considered when setting discharge limits for a plant.

- a. **Is there a statewide chlorine discharge limit? (For example, MD has a limit of 0.2 ppm for power plants and 0.1 ppm for other facilities). EPA standard is used (0.2 ppm BAT limit).**
- b. **What is the chlorine standard for ambient waters?**  
No standard has been adopted by the state, but there is an action level for chlorine (17 $\mu$ g/l).
- c. **Are any plants dechlorinating to meet the standard?**  
No.
- d. **Are any plants using bromine?**  
None known to use it on a regular basis.
- e. **What chemicals are plants typically required to monitor?**  
Fossil fuel plants typically required to monitor selenium, arsenic and other priority pollutants indicated in the full pollutant scan. Also, chemicals limited by the guidelines are monitored.
- f. **How frequently are plants required to perform full priority pollutant scans?**  
Coal plants have an annual full priority pollutant scan on the ash ponds. Nuclear plants have an annual scan on their low volume waste (not cooling water). Otherwise, every five years upon renewal.
- g. **Are plants required to monitor boiler cleaning chemicals?**  
Not specifically. Biocides and cleaning compounds are not monitored but are approved by the state on the basis of calculations to determine effluent limits.

- h. What is the usual frequency for effluent monitoring?  
Twice monthly for metals and priority pollutants identified during the full pollutant scan.
- i. Are effluents monitored at the end of the pipe?  
Yes. No mixing zone monitoring is permitted, except for temperature at some specific plants.

3. What toxics issues related to power plants are currently of concern to state regulators?

The releases of selenium from ash ponds into reservoirs have resulted in bioaccumulation and decreases in populations of fish. These have occurred at Hyco Lake and Belews Lake. Hyco Lake was included on the 304(l) list because selenium discharges exceed ambient water quality criteria. Changes in the ash handling systems at both lakes are expected to result in decreased levels of selenium in biota.

As part of their review of water quality standards, the state is examining metal bioavailability to determine the manner in which standards will be interpreted. For example, the new standards require measurement of total recoverable chromium and lead rather than the acid soluble methods specified in the EPA criteria documents.

North Carolina is also reviewing the chlorine toxicity data base for the purpose of adopting an ambient water quality standard.

- a. Are there any special concerns or research on atmospheric deposition of toxic chemicals from power plants?  
No.
- b. Are any new regulations aimed at power plants under consideration or recently adopted?  
No.
- c. Are there any court cases involving power plant effluents or emissions in progress or recently completed?  
No, but there is a prehearing permit appeal for a pH violation in an ash pond (acidic).

4. How many plants have biomonitoring test requirements in their permits?  
Almost all presently have this requirement.

- a. Will biomonitoring requirements be added to all new permits?  
Yes.

- b. When are samples collected--during periods of chlorination?  
No. Samples are collected from the ash basin and the low volume waste treatment facilities of a nuclear plant.
  - c. Are grab or composite samples collected?  
Grab samples are taken from the ash pond. Mixing in the ash pond effectively makes a grab sample similar to a composite sample.
  - d. Will biomonitoring tests require both acute and chronic tests?  
One or the other is required; test type is determined on a case-by-case basis and is dependent on conditions of the receiving stream.
5. Which power plants are on the final 304(l) list?  
Hyco Lake facility-Carolina Power & Light.
- a. What toxic compounds were the basis for the listing of each plant?  
A dry ash handling system is being installed and the ponds are being phased-out.
  - b. What are the Individual Control Strategies for the listed plants and have they been implemented? A dry ash handling system is being installed and the ponds are being phased out.
6. Have Toxicity Reduction Evaluations been conducted at any power plants?  
None have been conducted yet but will be required in the event of toxicity test failures.
- a. Please describe the major findings.  
NA.

**POWER PLANT TOXICS ISSUES QUESTIONNAIRE**  
**North Dakota**

**1. NAME, POSITION, AND AGENCY**

Sheila McClenathan  
Environmental Scientist  
Division of Water Quality  
State Dept. of Health  
1200 Missouri Ave  
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**2. What toxics discharge criteria are applied to power plants?**  
The EPA criteria.

- a. Is there a statewide chlorine discharge limit? (For example, MD has a limit of 0.2 ppm for power plants and 0.1 ppm for other facilities).  
The state uses the EPA BAT limit of 0.2 mg/l.
- b. What is the chlorine standard for ambient waters?  
0.011 mg/l chronic, 0.019 mg/l acute.
- c. Are any plants dechlorinating to meet the standard?  
No.
- d. Are any plants using bromine?  
Not aware of any.
- e. What chemicals are plants typically required to monitor?  
Chlorine, pH, and temperature.
- f. How frequently are plants required to perform full priority pollutant scans?  
Power plants are not required to perform pollutant scans if they can document that their plant waste streams are free from pollutants.
- g. Are plants required to monitor boiler cleaning chemicals?  
Yes, if the plants are discharging them.
- h. What is the usual frequency for effluent monitoring?  
It ranges from daily to weekly depending on the parameter being monitored.
- i. Are effluents monitored at the end of the pipe?  
Yes.

3. What toxics issues related to power plants are currently of concern to state regulators?  
None.
- a. Are there any special concerns or research on atmospheric deposition of toxic chemicals from power plants?  
NA.
  - b. Are any new regulations aimed at power plants under consideration or recently adopted?  
No.
  - c. Are there any court cases involving power plant emissions in progress or recently completed?  
No.
4. How many plants have biomonitoring test requirements in their permits?  
One.
- a. Will biomonitoring requirements be added to all new permits?  
Only to the major power plant permits.
  - b. When are samples collected--during periods of chlorination?
  - c. Are grab or composite samples collected?  
Grab.
  - d. Will biomonitoring tests require both acute and chronic tests?  
Acute only.
5. Which power plants are on the final 304(l) list?       None.
- a. What toxic compounds were the basis for the listing of each plant? NA.
  - b. What are the Individual Control Strategies for the listed plants and have they been implemented?  
NA.
6. Have Toxicity Reduction Evaluations been conducted at any power plants?  
No.
- a. Please describe the major findings. NA.

**POWER PLANT TOXICS ISSUES QUESTIONNAIRE**  
**Ohio**

**1. NAME, POSITION, AND AGENCY**

John Morrison  
Ohio EPA  
P.O. Box 1049  
1800 Watermark Dr.  
Columbus, OH 43266-0149  
614-644-2001

**2. What toxics discharge criteria are applied to power plants?**

Discharge criteria applied to power plants are for priority metals and chlorine. Of particular concern are levels of these pollutants in ash ponds.

- a. Is there a statewide chlorine discharge limit? (For example, MD has a limit of 0.2 ppm for power plants and 0.1 ppm for other facilities).  
Continuous discharge limit is 0.038 mg/l. Intermittent (up to 2 hrs/day) discharge limit is 0.2 mg/l. For plants which do not plan to use any chlorine, their permit specifies that no chlorine is permitted in the effluent.
- b. What is the chlorine standard for ambient waters?  
0.011 mg/l chronic (30 day average); 0.019 acute (daily maximum)
- c. Are any plants dechlorinating to meet the standard?  
One or two plants might be dechlorinating to meet the standard.
- d. Are any plants using bromine?  
Yes. One or two use bromine.
- e. What chemicals are plants typically required to monitor?  
Metals and chlorine.
- f. How frequently are plants required to perform full priority pollutant scans?  
A scan is required with each renewal. This is normally every 5 years, but will vary over the next few years while the state develops a new permitting schedule. The new schedule will establish a permit cycle based on drainage basin.
- g. Are plants required to monitor boiler cleaning chemicals?  
Not specifically.
- h. What is the usual frequency for effluent monitoring?  
Once per month for metals (ash ponds), more frequently for others (e.g., chlorine, temperature, etc.).

- i. Are effluents monitored at the end of the pipe?  
Standards must be met in the pipe.
3. What toxics issues related to power plants are currently of concern to state regulators?  
Chlorine and temperature.
  - a. Are there any special concerns or research on atmospheric deposition of toxic chemicals from power plants?  
No.
  - b. Are any new regulations aimed at power plants under consideration or recently adopted?  
No.
  - c. Are there any court cases involving power plant effluents or emissions in progress or recently completed?  
There are presently no court cases involving power plants, but two plants will probably be involved in court cases in the near future for thermal discharge problems.
4. How many plants have biomonitoring test requirements in their permits?  
None.
  - a. Will biomonitoring requirements be added to all new permits?  
No.
  - b. When are samples collected -- during periods of chlorination?  
NA.
  - c. Are grab or composite samples collected?  
NA.
  - d. Will biomonitoring tests require both acute and chronic tests?  
NA.
5. Which power plants are on the final 304(l) list?  
None.
  - a. What toxic compounds were the basis for the listing of each plant?  
NA.
  - b. What are the Individual Control Strategies for the listed plants and have they been implemented?  
NA.

6. Have Toxicity Reduction Evaluations been conducted at any power plants?  
No.

a. Please describe the major findings.  
NA.

**POWER PLANT TOXICS ISSUES QUESTIONNAIRE**  
**Oklahoma**

**1. NAME, POSITION, AND AGENCY**

Brooks Kirlin  
Senior Environmental Engineer  
Oklahoma Water Resources Board  
1000 NE 10th St.  
PO Box 53585  
Oklahoma City, OK 73152  
(405)231-2545

- 2. What toxics discharge criteria are applied to power plants?**  
Oklahoma is not yet delegated, but is developing a strategy to implement a state permitting system. EPA guidelines are used for water quality standards.
- a. **Is there a statewide chlorine discharge limit? (For example, MD has a limit of 0.2 ppm for power plants and 0.1 ppm for other facilities).  
BAT (0.2 mg/l) is used as the standard.**
  - b. **What is the chlorine standard for ambient waters?  
State has a narrative standard for ambient waters.**
  - c. **Are any plants dechlorinating to meet the standard?  
No plants are currently known to dechlorinate, but it could potentially be necessary for a plant to meet standards.**
  - d. **Are any plants using bromine?  
None known**
  - e. **What chemicals are plants typically required to monitor?  
Plants are required to monitor priority pollutants in their effluent.**
  - f. **How frequently are plants required to perform full priority pollutant scans?  
With permit application; more frequently on case by case basis.**
  - g. **Are plants required to monitor boiler cleaning chemicals?  
No specific monitoring for cleaning compounds, but priority pollutants contained in cleaning chemicals are monitored.**
  - h. **What is the usual frequency for effluent monitoring?  
Monitoring frequency varies on a case basis (e.g. continuous, 2-3X/week, 2X/month).**

- i. Are effluents monitored at the end of the pipe?  
Yes.
3. What toxics issues related to power plants are currently of concern to state regulators?  
Regulators are reviewing chlorine toxicity data to determine if a numerical rather than narrative standard should be developed. Information on the toxicity of scale inhibitors (used in cooling towers) is being gathered to insure that permits are protective.
- a. Are there any special concerns or research on atmospheric deposition of toxic chemicals from power plants?  
No
  - b. Are any new regulations aimed at power plants under consideration or recently adopted?  
No
  - c. Are there any court cases involving power plant emissions in progress or recently completed?  
No
  - d. Will biomonitoring tests require both acute and chronic tests?  
Case by case.
4. How many plants have biomonitoring test requirements in their permits?  
Biomonitoring test requirements follow federal guidelines. Major dischargers required to conduct toxicity tests. Current number of power plants with biomonitoring requirements in their permits not known.
- a. Will biomonitoring requirements be added to all new permits?  
Oklahoma's implementation strategy will require biomonitoring at major discharge facilities; requirement will be expanded to include minor facilities if funding and manpower are available.
  - b. When are samples collected--during periods of chlorination?  
Samples will be collected in a manner which is representative of periods of chlorination.  
The general policy is to dechlorinate before testing.
  - c. Are grab or composite samples collected?  
24 hour composite samples collected.

5. Which power plants are on the final 304(l) list?  
None.
- a. What toxic compounds were the basis for the listing of each plant?  
NA
  - b. What are the Individual Control Strategies for the listed plants and have they been implemented?  
NA
6. Have Toxicity Reduction Evaluations been conducted at any power plants?  
None conducted because there have been no toxicity test failures. In the event of a failure and a failure of one of the subsequent retests (3 consecutive 7 day tests), a TRE will be required.
- a. Please describe the major findings.  
NA

**POWER PLANT TOXICS ISSUES QUESTIONNAIRE**  
**Oregon**

**1. NAME, POSITION, AND AGENCY**

Bill Sobolewski  
EPA Oregon Operations Office  
811 SW 6th Ave.  
Portland, OR 92074  
(503) 326-2651

**2. What toxics discharge criteria are applied to power plants?**

Oregon DEQ follows the EPA criteria. Oregon has only one non-hydroelectric power plant (nuclear) with an NPDES permit.

- a. Is there a statewide chlorine discharge limit? (For example, MD has a limit of 0.2 ppm for power plants and 0.1 ppm for other facilities).  
EPA criteria. [BAT limit = 0.2 ppm]
- b. What is the chlorine standard for ambient waters?  
EPA criteria.
- c. Are any plants dechlorinating to meet the standard?  
No.
- d. Are any plants using bromine?  
No.
- e. What chemicals are plants typically required to monitor?  
Boron (Trojan nuclear facility), sodium, total residual chlorine, sulfate, aluminum
- f. How frequently are plants required to perform full priority pollutant scans?  
Not required at Trojan nuclear facility.
- g. Are plants required to monitor boiler cleaning chemicals?  
No.
- h. What is the usual frequency for effluent monitoring?  
At least quarterly, possibly more often.
- i. Are effluents monitored at the end of the pipe?  
Yes.

3. What toxic issues related to power plants are currently of concern to state regulators?  
None.
- a. Are there any special concerns or research on atmospheric deposition of toxic chemicals from power plants?  
No. The only non-hydro plant is nuclear with noncontact cooling water.
  - b. Are any new regulations aimed at power plants under consideration or recently adopted?  
No.
  - c. Are there any court cases involving power plant effluents or emissions in progress or recently completed?  
No, but there was a measure (defeated) on the ballot to close the nuclear plant.
4. How many plants have biomonitoring test requirements in their permits?  
No power plants have biomonitoring requirements.
- a. Will biomonitoring requirements be added to all new permits?  
Industrial and municipal permit holders will have a biomonitoring requirement in new permits, power plants will not.
  - b. When are samples collected--during periods of chlorination?  
No. Nuclear facility does not chlorinate.
  - c. Are grab or composite samples collected?  
Not applicable to power plants, but other permit holders will use grab and composite samples.
  - d. Will biomonitoring tests require both acute and chronic tests?  
Not applicable to power plants; permit holders with biomonitoring requirements will conduct acute and chronic tests.
5. Which power plants are on the final 304(l) list?  
No.
- a. What toxic compounds were the basis for the listing of each plant?  
NA
  - b. What are the Individual Control Strategies for the listed plants and have they been implemented?  
NA

6. Have Toxicity Reduction Evaluations been conducted at any power plants?  
No.

a. Please describe the major findings.  
NA

**POWER PLANT TOXICS ISSUES QUESTIONNAIRE**  
**Pennsylvania**

**1. NAME, POSITION, AND AGENCY**

Mike Bilger  
Pennsylvania Permit and Compliance  
12th Floor Fulton Building  
PO Box 2063  
Harrisburg, PA 17105  
717-787-8184

**2. What toxics discharge criteria are applied to power plants?**  
**A Combination of EPA and state guidelines.**

- a. Is there a statewide chlorine discharge limit? (For example, MD has a limit of 0.2 ppm for power plants and 0.1 ppm for other facilities). No. The state has no discharge limit for chlorine. The power plants should minimize the use of chlorine and try to maintain a low chlorine discharge level.
- b. What is the chlorine standard for ambient waters? The state uses a narrative standard which is described in section 94.6 of their water quality standards.
- c. Are any plants dechlorinating to meet the standard?  
No.
- d. Are any plants using bromine? Some plants on Lake Erie may be using the commercial product ACTI-BROM® to prevent fouling by the zebra mussel.
- e. What chemicals are plants typically required to monitor? The chemicals vary among plants (e.g. lead, zinc, aluminum, cyanide).
- f. How frequently are plants required to perform full priority pollutant scans?  
Once every five years.
- g. Are plants required to monitor boiler cleaning chemicals? Yes, if the chemicals are considered toxic to aquatic organisms.
- h. What is the usual frequency for effluent monitoring? Quarterly.
- i. Are effluents monitored at the end of the pipe?  
When performing acute tests, effluents are sampled at the end of the pipe; for chronic tests, effluents are taken along the waste streams.

3. What toxics issues related to power plants are currently of concern to state regulators? Generally heavy metals and biocides.
  - a. Are there any special concerns or research on atmospheric deposition of toxic chemicals from power plants? NA.
  - b. Are any new regulations aimed at power plants under consideration or recently adopted? No.
  - c. Are there any court cases involving power plant emissions in progress or recently completed? No.
  
4. How many plants have biomonitoring test requirements in their permits? 3 power plants.
  - a. Will biomonitoring requirements be added to all new permits? Biomonitoring requirements will be added to some new permits.
  - b. When are samples collected--during periods of chlorination? Samples are collected before and after chlorination events.
  - c. Are grab or composite samples collected?  
24 hour composite samples.
  - d. Will biomonitoring tests require both acute and chronic tests? The type of tests will be based on the dilution ratios: > 20:1 acute, < 20:1 chronic.
  
5. Which power plants are on the final 304(l) list?  
Duquesne Light-Cheswick Power
  - a. What toxic compounds were the basis for the listing of each plant?  
Parameters chosen from EPA and PA, model, (about 30 to 40).
  - b. What are the Individual Control Strategies for the listed plants and have they been implemented? The individual control strategies are in predraft status at this time.
  
6. Have Toxicity Reduction Evaluations been conducted at any power plants? No.
  - a. Please describe the major findings. NA.

**POWER PLANT TOXICS ISSUES QUESTIONNAIRE**  
**Rhode Island**

**1. NAME, POSITION, AND AGENCY**

Carlene Newman  
Associate Supervising Sanitary Engineer  
Division of Water Resources  
291 Promenade Street  
Providence, RI 02908-5767  
(401) 277-6519

**2. What toxics discharge criteria are applied to power plants?**  
The EPA criteria is used.

- a. Is there a statewide chlorine discharge limit? (For example, MD has a limit of 0.2 ppm for power plants and 0.1 ppm for other facilities). The EPA BAT limit of 0.2 mg/l.
- b. What is the chlorine standard for ambient waters?  
The Rhode Island standards follow the EPA guidelines.
- c. Are any plants dechlorinating to meet the standard?  
No.
- d. Are any plants using bromine?  
No.
- e. What chemicals are plants typically required to monitor? Plants are required to monitor chlorine, pH, flow, suspended solids, and temperature.
- f. How frequently are plants required to perform full priority pollutant scans?  
Once a year.
- g. Are plants required to monitor boiler cleaning chemicals? No cleaning chemicals are monitored at this time. If a plant decides to use a toxic cleaning chemical, then it would be required to monitor for that chemical.
- h. What is the usual frequency for effluent monitoring?  
It varies from daily to monthly depending on the parameter being monitored (e.g., pH is monitored daily).
- i. Are effluents monitored at the end of the pipe?  
Yes, however some effluents are monitored internally at the source.

3. What toxics issues related to power plants are currently of concern to state regulators? The effluent from one power plant exceeds the ambient water quality standard for chlorine.
  - a. Are there any special concerns or research on atmospheric deposition of toxic chemicals from power plants? NA.
  - b. Are any new regulations aimed at power plants under consideration or recently adopted? No.
  - c. Are there any court cases involving power plant emissions in progress or recently completed? No.
  
4. How many plants have biomonitoring test requirements in their permits? Three power plants.
  - a. Will biomonitoring requirements be added to all new permits? Yes.
  - b. When are samples collected--during periods of chlorination? Samples are collected during periods of chlorination.
  - c. Are grab or composite samples collected? Composite.
  - d. Will biomonitoring tests require both acute and chronic tests? Acute only.
  
5. Which power plants are on the final 304(l) list? None.
  - a. What toxic compounds were the basis for the listing of each plant? NA.
  - b. What are the Individual Control Strategies for the listed plants and have they been implemented? NA.
  
6. Have Toxicity Reduction Evaluations been conducted at any power plants? No.
  - a. Please describe the major findings. NA.

**POWER PLANT TOXICS ISSUES QUESTIONNAIRE**  
**South Carolina**

**1. NAME, POSITION, AND AGENCY**

Bart Ruiter  
Division Director  
Industrial and Agricultural Waster Water Division  
SCDHEC  
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Columbia, SC 29201  
803-734-5253

**2. What toxics discharge criteria are applied to power plants?  
EPA guidelines.**

- a. **Is there a statewide chlorine discharge limit? (For example, MD has a limit of 0.2 ppm for power plants and 0.1 ppm for other facilities). They use 0.2 mg/l or ambient water quality standard, whichever is more stringent.**
- b. **What is the chlorine standard for ambient waters?  
0.019 mg/l acute, 0.011 mg/l chronic for freshwater; 0.013 mg/l acute, 0.0075 mg/l chronic for saltwater.**
- c. **Are any plants dechlorinating to meet the standard?  
Not at this time, but some may be required to next year.**
- d. **Are any plants using bromine?  
No.**
- e. **What chemicals are plants typically required to monitor? EPA priority pollutants.**
- f. **How frequently are plants required to perform full priority pollutant scans?  
Once every 5 years for permit renewal.**
- g. **Are plants required to monitor boiler cleaning chemicals? Requirements are plant-specific; some plants monitor hydrazine, ethylene glycol.**
- h. **What is the usual frequency for effluent monitoring?  
A minimum of twice monthly, however some monitoring may be more frequent depending on the parameter.**
- i. **Are effluents monitored at the end of the pipe?  
In most plants effluents are monitored at the end of the pipe, however in some plants internal monitoring may also be required.**

3. What toxics issues related to power plants are currently of concern to state regulators?

There is concern that plants could emit large amounts of cleaning chemicals (e.g., hydrazine). This potential impact has been handled in two ways. Several plants have effluent limits for hydrazine. Biomonitoring is also used to try to evaluate the potential impacts of power plant discharges. Acute tests will be required at first monthly and then quarterly for plants that discharge into coves or other lower-flow areas and do not have diffusers. Plants must have effects at the 100% effluent concentration to avoid having to run chronic tests.

A further concern is the use of ash ponds to treat and hold runoff from coal and ash piles. The state will add ground water monitoring requirements to all new permits with ash ponds.

- a. Are there any special concerns or research on atmospheric deposition of toxic chemicals from power plants? NA.
- b. Are any new regulations aimed at power plants under consideration or recently adopted? No.
- c. Are there any court cases involving power plant emissions in progress or recently completed? No.

4. How many plants have biomonitoring test requirements in their permits? 1 plant.

- a. Will biomonitoring requirements be added to all new permits? Yes; it is an important part of the states strategy.
- b. When are samples collected--during periods of chlorination? Samples are collected during periods of chlorination and are dechlorinated prior to testing. Biomonitoring is required for plants using other chemicals (e.g., cleaning agents) in addition to chlorine.
- c. Are grab or composite samples collected? Not sure.
- d. Will biomonitoring tests require both acute and chronic tests? Depends on whether the plant uses a diffuser; chronic tests with a diffuser, acute tests without a diffuser.

5. Which power plants are on the final 304(l) list?  
None.

- a. What toxic compounds were the basis for the listing of each plant? NA.

- b. What are the Individual Control Strategies for the listed plants and have they been implemented? NA.
- 6. Have Toxicity Reduction Evaluations been conducted at any power plants? No.
  - a. Please describe the major findings. NA.

**POWER PLANT TOXICS ISSUES QUESTIONNAIRE**  
**South Dakota**

**1. NAME, POSITION, AND AGENCY**

Tim Tollefsrud  
Dept. of Water and Natural Resources  
Joe Foss Building  
Pierre, SD 57501  
(605) 773-3351

**2. What toxics discharge criteria are applied to power plants?**

South Dakota presently has only one power plant in operation. The plant is self contained and holds its wastes in lagoons.

- a. Is there a statewide chlorine discharge limit? (For example, MD has a limit of 0.2 ppm for power plants and 0.1 ppm for other facilities).  
Chlorine limit is 0.02 mg/l if the effluent is discharged into waters that support a fishery.
- b. What is the chlorine standard for ambient waters? [Same as EPA guidelines?
- c. Are any plants dechlorinating to meet the standard? No.
- d. Are any plants using bromine? No.
- e. What chemicals are plants typically required to monitor?  
For the one plant in operation, metals and other pollutants identified from the pollutant scan are monitored before any discharge from the lagoon.
- f. How frequently are plants required to perform full priority pollutant scans?  
A scan is required prior to each release from a lagoon.
- g. Are plants required to monitor boiler cleaning chemicals?  
Indirectly. Any cleaning compounds will be monitored during the scan prior to and during discharge from a lagoon.
- h. What is the usual frequency for effluent monitoring?  
After discharge is approved, monitoring must be done three times during the first week of discharge and then once per week for succeeding weeks. The existing plant has never discharged so routine monitoring has never been done.
- i. Are effluents monitored at the end of the pipe?  
Monitoring is done in the lagoon.

3. What toxics issues related to power plants are currently of concern to state regulators? None.
  - a. Are there any special concerns or research on atmospheric deposition of toxic chemicals from power plants?  
No.
  - b. Are any new regulations aimed at power plants under consideration or recently adopted?  
No.
  - c. Are there any court cases involving power plant emissions in progress or recently completed?  
No.
  
4. How many plants have biomonitoring test requirements in their permits?
  - a. Will biomonitoring requirements be added to all new permits?  
Yes. The current power plant is being slowly dismantled and a new plant is in preliminary planning stages. Biomonitoring requirements for the new plant are not definite, but will most likely be included in any future permits.
  - b. When are samples collected--during periods of chlorination?  
NA. Samples are collected from the lagoon if and when discharge takes place.
  - c. Are grab or composite samples collected?  
Composite.
  - d. Will biomonitoring tests require both acute and chronic tests?  
Not answered.
  
5. Which power plants are on the final 304(l) list?
  - a. What toxic compounds were the basis for the listing of each plant?  
NA.
  - b. What are the Individual Control Strategies for the listed plants and have they been implemented?  
NA.
  
6. Have Toxicity Reduction Evaluations been conducted at any power plants?
  - a. Please describe the major findings. NA.

**POWER PLANT TOXICS ISSUES QUESTIONNAIRE**  
**Tennessee**

**1. NAME, POSITION, AND AGENCY**

Phil Simmons  
Tennessee Division of Water Pollution Control  
150 9th Ave North  
Terra Building, 4th Floor  
Nashville, TN 37247-3420  
615-741-7883

**2. What toxics discharge criteria are applied to power plants?  
EPA guidelines.**

- a. Is there a statewide chlorine discharge limit? (For example, MD has a limit of 0.2 ppm for power plants and 0.1 ppm for other facilities). The standard is 0.2 mg/l BAT.
- b. What is the chlorine standard for ambient waters?  
0.019 mg/l acute; Tennessee does not use a chronic standard.
- c. Are any plants dechlorinating to meet the standard?  
No.
- d. Are any plants using bromine?  
Yes, there are 3 fossil fuel plants using bromine as a biocide. It is regulated using the chlorine standard (0.2 mg/L Total Residual Oxidant).
- e. What chemicals are plants typically required to monitor? All plants are required to monitor copper and iron, and some plants (case by case basis) must monitor nickel, zinc, and selenium.
- f. How frequently are plants required to perform full priority pollutant scans?  
Every 5 years with permit application.
- g. Are plants required to monitor boiler cleaning chemicals?  
Yes, plants have to submit manufacturers' toxicity data. State reviews information and sets acceptable level.
- h. What is the usual frequency for effluent monitoring?  
It is site specific depending on the size of the power plant and the types of pollutants being monitored.
- i. Are effluents monitored at the end of the pipe?  
Yes.

3. What toxics issues related to power plants are currently of concern to state regulators? None at this time.
  - a. Are there any special concerns or research on atmospheric deposition of toxic chemicals from power plants? No.
  - b. Are any new regulations aimed at power plants under consideration or recently adopted? No.
  - c. Are there any court cases involving power plant emissions in progress or recently completed? No.
  
4. How many plants have biomonitoring test requirements in their permits? Some plants have ongoing biomonitoring programs and have whole effluent toxicity limits in their permits.
  - a. Will biomonitoring requirements be added to all new permits? Not known at this time. It is an important part of Tennessee's permitting system.
  - b. When are samples collected--during periods of chlorination? Samples are collected during the plants "normal operation" period, probably not during chlorination events.
  - c. Are grab or composite samples collected? Grab samples are collected.
  - d. Will biomonitoring tests require both acute and chronic tests? Yes.
  
5. Which power plants are on the final 304(l) list? None.
  - a. What toxic compounds were the basis for the listing of each plant? NA.
  - b. What are the Individual Control Strategies for the listed plants and have they been implemented? NA.
  
6. Have Toxicity Reduction Evaluations been conducted at any power plants? No.
  - a. Please describe the major findings. NA.

**POWER PLANT TOXICS ISSUES QUESTIONNAIRE**  
**Texas**

**1. NAME, POSITION, AND AGENCY**

Ray Newton  
Texas Water Commission/Water Quality Division  
PO Box 13087  
Capitol Station  
Austin, TX 78711-3087  
(512)463-7730

**2. What toxics discharge criteria are applied to power plants?**

Texas water quality standards include approximately 30 toxics at the present time, with 33 proposed additions. Power plants are required to meet the state standards.

- a. Is there a statewide chlorine discharge limit? (For example MD has a limit of 0.2 ppm for power plants and 0.1 ppm for other facilities).  
EPA BAT (0.2 mg/l)
- b. What is the chlorine standard for ambient waters?  
Same as EPA guidelines.
- c. Are any plants dechlorinating to meet the standard?  
No.
- d. Are any plants using bromine?  
8-10 plants currently use a bromine/chlorine mixture.
- e. What chemicals are plants typically required to monitor?  
Only those pollutants indicated in the waste stream. Monitoring is usually only done for metals (e.g. Fe, Cu) during boiler cleaning operations.
- f. How frequently are plants required to perform full priority pollutant scans?  
Once every 5 years.
- g. Are plants required to monitor boiler cleaning chemicals?  
Yes. Metals are monitored during cleaning operations.  
Cleaning wastes are treated to meet guidelines before being discharged.
- h. What is the usual frequency for effluent monitoring?  
Only during cleaning operations.

- i. Are effluents monitored at the end of the pipe?  
Water quality standards must be met at the end of the pipe. Low volume wastes are collected, treated and pollutant levels are measured before the effluent enters the cooling water, lake or stream.
3. What toxics issues related to power plants are currently of concern to state regulators?  
None.
- a. Are there any special concerns or research on atmospheric deposition of toxic chemicals from power plants?  
No.
  - b. Are any new regulations aimed at power plants under consideration or recently adopted?  
No.
  - c. Are there any court cases involving power plant effluents or emissions in progress or recently completed?  
No.
4. How many plants have biomonitoring test requirements in their permits?  
Major dischargers have biomonitoring requirements. This includes approximately 40 of 108 power plants.
- a. Will biomonitoring requirements be added to all new permits?  
No.
  - b. When are samples collected--during periods of chlorination?  
Twelve 2 hour composite samples are collected which should includes samples from periods of chlorination.
  - c. Are grab or composite samples collected?  
Composite.
  - d. Will biomonitoring tests require both acute and chronic tests?  
Chronic.
5. Which power plants are on the final 304(l) list?  
None.
- a. What toxic compounds were the basis for the listing of each plant?  
NA
  - b. What are the Individual Control Strategies for the listed plants and have they been implemented?  
NA

**6. Have Toxicity Reduction Evaluations been conducted at any power plants?  
Yes.**

- a. Please describe the major findings.  
A TRE is currently in progress at a small power facility with cooling towers.  
The plant has intermittent toxicity problems, the source of which has not  
yet been identified.**

**POWER PLANT TOXICS ISSUES QUESTIONNAIRE**  
**Utah**

**1. NAME, POSITION, AND AGENCY**

Steve McNeal  
Bureau of Water and Pollution Control  
PO Box 16690  
Salt Lake City, UT 84116-0690  
801-538-6146

**2. What toxics discharge criteria are applied to power plants?  
EPA guidelines.**

- a. Is there a statewide chlorine discharge limit? (For example, MD has a limit of 0.2 ppm for power plants and 0.1 ppm for other facilities). The EPA limit of 0.2 mg/l (average) and 0.5 mg/l (maximum) is used.
- b. What is the chlorine standard for ambient waters?  
EPA criteria: 0.011 mg/l chronic and 0.019 mg/l acute.
- c. Are any plants dechlorinating to meet the standard?  
No.
- d. Are any plants using bromine?  
No.
- e. What chemicals are plants typically required to monitor? Chlorine and iron.
- f. How frequently are plants required to perform full priority pollutant scans?  
Once a year. Plant may present calculations that amount is nondetectable instead of testing.
- g. Are plants required to monitor boiler cleaning chemicals? No. Permit requires no discharge of chemicals.
- h. What is the usual frequency for effluent monitoring?  
Frequency is parameter dependent; weekly for suspended solids and chlorine, quarterly for iron.
- i. Are effluents monitored at the end of the pipe?  
Yes.

3. What toxics issues related to power plants are currently of concern to state regulators? None.
  - a. Are there any special concerns or research on atmospheric deposition of toxic chemicals from power plants? No.
  - b. Are any new regulations aimed at power plants under consideration or recently adopted? No.
  - c. Are there any court cases involving power plant emissions in progress or recently completed? No.
4. How many plants have biomonitoring test requirements in their permits? One plant.
  - a. Will biomonitoring requirements be added to all new permits? Possibly.
  - b. When are samples collected--during periods of chlorination? Not specified.
  - c. Are grab or composite samples collected?  
24-hour composite and grab samples are collected for chlorine.
  - d. Will biomonitoring tests require both acute and chronic tests? Acute only for existing discharges.
5. Which power plants are on the final 304(l) list? None.
  - a. What toxic compounds were the basis for the listing of each plant? NA.
  - b. What are the Individual Control Strategies for the listed plants and have they been implemented? NA.
6. Have Toxicity Reduction Evaluations been conducted at any power plants? No.
  - a. Please describe the major findings. NA.

**POWER PLANT TOXICS ISSUES QUESTIONNAIRE**  
**Vermont**

**1. NAME, POSITION, AND AGENCY**

Brian Kooiker  
Vermont Dept of Environmental Conservation  
Annex Building  
103 South Main Street  
Waterbury, VT 05676  
802-244-5674

**2. What toxics discharge criteria are applied to power plants?  
EPA guidelines.**

- a. Is there a statewide chlorine discharge limit? (For example, MD has a limit of 0.2 ppm for power plants and 0.1 ppm for other facilities). Vermont uses the EPA BAT standard of 0.2 ppm.
- b. What is the chlorine standard for ambient waters?  
Vermont uses EPA criteria.
- c. Are any plants dechlorinating to meet the standard?  
No.
- d. Are any plants using bromine?  
Not at this time, however 1 plant has the option to use bromine in their permit.
- e. What chemicals are plants typically required to monitor? Chlorine, pH, thermal, total suspended solids, and other cleaning chemicals.
- f. How frequently are plants required to perform full priority pollutant scans?  
Once every 5 years.
- g. Are plants required to monitor boiler cleaning chemicals? Some plants may be required to monitor certain cleaning chemicals (i.e. hydrazine).
- h. What is the usual frequency for effluent monitoring?  
Frequency depends on the parameter being monitored (ie. thermal discharge is monitored daily).
- i. Are effluents monitored at the end of the pipe?  
Yes.

3. What toxics issues related to power plants are currently of concern to state regulators? None at this time.
  - a. Are there any special concerns or research on atmospheric deposition of toxic chemicals from power plants? No.
  - b. Are any new regulations aimed at power plants under consideration or recently adopted? No.
  - c. Are there any court cases involving power plant emissions in progress or recently completed? No.
4. How many plants have biomonitoring test requirements in their permits? No.
  - a. Will biomonitoring requirements be added to all new permits? Possibly some new permits may get biomonitoring requirements.
  - b. When are samples collected--during periods of chlorination? NA.
  - c. Are grab or composite samples collected? NA.
  - d. Will biomonitoring tests require both acute and chronic tests? NA.
5. Which power plants are on the final 304(l) list?  
None.
  - a. What toxic compounds were the basis for the listing of each plant? NA.
  - b. What are the Individual Control Strategies for the listed plants and have they been implemented? NA.
6. Have Toxicity Reduction Evaluations been conducted at any power plants? NA.
  - a. Please describe the major findings. NA.

**POWER PLANT TOXICS ISSUES QUESTIONNAIRE**  
**Virginia**

**1. NAME, POSITION, AND AGENCY**

Ken Roller  
Toxic Management Program  
State Water Control Board  
2111 North Hamilton Street  
PO Box 11143  
Richmond, VA 23230  
804-367-0056

**2. What toxics discharge criteria are applied to power plants?**  
Combination of EPA and state guidelines.

- a. Is there a statewide chlorine discharge limit? (For example, MD has a limit of 0.2 ppm for power plants and 0.1 ppm for other facilities).
- b. What is the chlorine standard for ambient waters?  
EPA criteria: 0.011 mg/l chronic and 0.019 mg/l acute (for freshwater).
- c. Are any plants dechlorinating to meet the standard?  
Yes.
- d. Are any plants using bromine?  
No.
- e. What chemicals are plants typically required to monitor? The priority metals in the EPA guidelines, 307(a) plus non-priority organics, inorganics, and pesticides.
- f. How frequently are plants required to perform full priority pollutant scans? Quarterly for 1 year, then based on the results appropriate limitations are set or additional monitoring may be required.
- g. Are plants required to monitor boiler cleaning chemicals? Monitoring is site specific depending on what chemicals are present in the pollutant scan.
- h. What is the usual frequency for effluent monitoring?  
Quarterly for 1 year.
- i. Are effluents monitored at the end of the pipe?  
Yes.

3. What toxics issues related to power plants are currently of concern to state regulators? None at this time.
- a. Are there any special concerns or research on atmospheric deposition of toxic chemicals from power plants? NA.
  - b. Are any new regulations aimed at power plants under consideration or recently adopted? No.
  - c. Are there any court cases involving power plant emissions in progress or recently completed? No.
4. How many plants have biomonitoring test requirements in their permits?  
Currently 23.
- a. Will biomonitoring requirements be added to all new permits?  
Probably - depends on applicability of toxics regulations to effluents discharged.
  - b. When are samples collected--during periods of chlorination?  
  
Grab samples must be collected during periods of chlorination.  
We have no specific requirements that a particular effluent be sampled during chlorination; however, our permit regulation requires that the permittee collect samples which are "representative of the monitored activity." Therefore, if chlorine is applied intermittently, then a representative portion of the 24-hour composite sample should be collected during a period when chlorine is being applied.
  - c. Are grab or composite samples collected?  
  
If a discharge is continuous, the permittee is required to collect 24-hour composite samples for use in performing the toxicity tests or chemical analyses. The only exception would be a discharge from a sedimentation basin or holding pond with a retention time greater than 14 days. In this case, the effluent characteristics are assumed to remain relatively stable over a 24-hour period and grab samples are allowed. At a minimum, the 24-hour composite samples are to consist of 4 samples collected at evenly spaced 6-hour intervals during the sampling period. Grab sampling is required for intermittent discharges. In the case of stormwater effluents, semiannual, rather than quarterly, testing is required in order to ensure that a sample can be obtained during the sampling period.
  - d. Will biomonitoring tests require both acute and chronic tests?  
Yes. If applicable (if predicted effluent concentration in receiving stream is  $\geq 1\%$  during critical flow periods).

5. Which power plants are on the final 304(l) list?  
None.
- a. What toxic compounds were the basis for the listing of each plant? NA.
  - b. What are the Individual Control Strategies for the listed plants and have they been implemented?  
NA.
6. Have Toxicity Reduction Evaluations been conducted at any power plants? No.
- a. Please describe the major findings. NA.

**POWER PLANT TOXICS ISSUES QUESTIONNAIRE**  
**Washington**

**1. NAME, POSITION, AND AGENCY**

Dave Raggsdale  
USEPA  
Region X  
c/o Dept. of Ecology PV 11  
Olympia, WA 98504  
(206)753-9080

**2. What toxics discharge criteria are applied to power plants?**

Washington uses the EPA standards for pollutants. The Washington state water quality regulations have a narrative standard which states that no toxic pollutants may be discharged in toxic amounts.

- a. Is there a statewide chlorine discharge limit? (For example, MD has a limit of 0.2 ppm for power plants and 0.1 ppm for other facilities).  
Same as EPA standard (0.2 ppm BAT).
- b. What is the chlorine standard for ambient waters?  
Same as EPA AWQC.
- c. Are any plants dechlorinating to meet the standard?  
No.
- d. Are any plants using bromine?  
No.
- e. What chemicals are plants typically required to monitor?  
Oil and grease, pH, TRC and priority effluents.
- f. How frequently are plants required to perform full priority pollutant scans?  
Most plants are required to perform a full priority pollutant scan with the permit renewal application (every five years). The Pacific Power and Light coal plant, however, is required to perform semiannual scans.
- g. Are plants required to monitor boiler cleaning chemicals?  
Plants do not specifically monitor cleaning compounds. Monitoring is done for priority pollutants which may be contained in the cleaners.
- h. What is the usual frequency for effluent monitoring?  
Coal plants monitor daily for pH, TSS and flow. Nuclear plants monitor continuously for pH and TRC. Both types of plants monitor metals and priority pollutants on a semiannual basis.

- i. **Are effluents monitored at the end of the pipe?**  
Yes. Effluent limitations apply to concentrations in the pipe and not in a mixing zone.
3. **What toxics issues related to power plants are currently of concern to state regulators?**  
None.
- a. **Are there any special concerns or research on atmospheric deposition of toxic chemicals from power plants?**  
No.
  - b. **Are any new regulations aimed at power plants under consideration or recently adopted?**  
No.
  - c. **Are there any court cases involving power plant effluents or emissions in progress or recently completed?**  
No court cases in progress, but there may currently be one or more permit appeals in process.
4. **How many plants have biomonitoring test requirements in their permits?**  
Number not known, but some do have this requirement.
- a. **Will biomonitoring requirements be added to all new permits?**  
Yes.
  - b. **When are samples collected--during periods of chlorination?**  
Yes. Samples must be representative of effluent.
  - c. **Are grab or composite samples collected?**  
Composite (24 hour)
  - d. **Will biomonitoring tests require both acute and chronic tests?**  
Yes.
5. **Which power plants are on the final 304(l) list?**  
None.
- a. **What toxic compounds were the basis for the listing of each plant?** NA
  - b. **What are the Individual Control Strategies for the listed plants and have they been implemented?** NA

6. Have Toxicity Reduction Evaluations been conducted at any power plants?  
Not yet, but toxicity test failures will trigger a TRE.
- a. Please describe the major findings.  
NA

**POWER PLANT TOXICS ISSUES QUESTIONNAIRE**  
**West Virginia**

**1. NAME, POSITION, AND AGENCY**

Dwight McClure  
Division of Water Resources  
1201 Greenbriar St.  
Charleston, WV  
(304) 348-2107

**2. What toxics discharge criteria are applied to power plants?**  
West Virginia follows the EPA guidelines for Discharge criteria.

- a. Is there a statewide chlorine discharge limit? (For example, MD has a limit of 0.2 ppm for power plants and 0.1 ppm for other facilities).  
Chlorine discharge limit is 0.2 mg/l (24 hr average) with a maximum of 0.5 mg/l at any given time.
- b. What is the chlorine standard for ambient waters?  
Warm water ambient standard is 10  $\mu\text{g/l}$ . Chlorine standard for trout streams is 0  $\mu\text{g/l}$  (not detectable).
- c. Are any plants dechlorinating to meet the standard?  
One plant dechlorinates and many plants no longer use chlorine.
- d. Are any plants using bromine?  
A few use bromine and some use other biocides. If alternate biocides are used the plant is required to submit the MSDS with the application for permission to use the biocide. The plant is also required to conduct bioassays with the new biocide to determine a safe concentration.
- e. What chemicals are plants typically required to monitor?  
TSS, oil and grease, pH and blowdown contaminants (e.g., TRC).
- f. How frequently are plants required to perform full priority pollutant scans?  
Full priority pollutant scans are not required with permit renewals because no problems have been detected with previous scans.
- g. Are plants required to monitor boiler cleaning chemicals?  
Boiler cleaning waste is monitored for copper and iron. The waste stream from boiler cleaning is monitored/treated before joining waste streams from other sources. Some plants burn the boiler cleaning wastewater.



5. Which power plants are on the final 304(l) list?  
NA.
- a. What toxic compounds were the basis for the listing of each plant?  
NA.
- b. What are the Individual Control Strategies for the listed plants and have they been implemented?  
NA.
6. Have Toxicity Reduction Evaluations been conducted at any power plants?  
No. Problems have not been detected with previous bioassays.
- a. Please describe the major findings.  
NA.

**POWER PLANT TOXICS ISSUES QUESTIONNAIRE**  
**Wisconsin**

**1. NAME, POSITION, AND AGENCY**

Mr. Larry Benson  
Department of Natural Resources  
101 S. Webster Street  
Madison, WI 53707  
608-266-8229

**2. What toxics discharge criteria are applied to power plants?**

- a. Is there a statewide chlorine discharge limit? (For example, MD has a limit of 0.2 ppm for power plants and 0.1 ppm for other facilities). Wisconsin currently uses the EPA BAT limit of 0.20 ppm for 2 hours per day. It is considering a limit of 37  $\mu\text{g/L}$  total residual chlorine.
- b. What is the chlorine standard for ambient waters?  
The standards (NR 105) are: 18.4  $\mu\text{g/L}$  (acute) and 7.06  $\mu\text{g/L}$  (chronic).
- c. Are any plants dechlorinating to meet the standard?  
One nuclear plant is dechlorinating to meet the 0.2 ppm limit.
- d. Are any plants using bromine?  
One plant with cooling towers is using a chlorine-bromine combination. It has no discharge to surface waters because blowdown is discharged to an unlined pond for evaporation.
- e. What chemicals are plants typically required to monitor?  
Plants would need to monitor any chemicals that were found in appreciable concentrations in the priority pollutant scan submitted with the permit application. In plants with cooling towers, the most commonly monitored chemicals are zinc and copper. Aluminum has been showing up in some scans at once-through cooling plants and may be added to new permits. The source of the aluminum is unknown.
- f. How frequently are plants required to perform full priority pollutant scans?  
Once every five years.
- g. Are plants required to monitor boiler cleaning chemicals?  
If there is a direct discharge without mixing with cooling water. There has been little concern for toxicity to date about these compounds.

- h. What is the usual frequency for effluent monitoring?  
 Continuous: flow pH  
 Daily: total residual chlorine, total suspended solids  
 Weekly or monthly metals
  - i. Are effluents monitored at the end of the pipe?  
 Yes.
3. What toxics issues related to power plants are currently of concern to state regulators?  
 The use of chlorine-bromine mixtures. Plants that use any biocides other than chlorine will need to submit aquatic toxicity data. Permit limits may be 10% of the LC50 and would have to be met through restricted use (short periods of use during the day). So far metals have not been a problem although one plant with cooling towers was required to monitor for zinc.
- a. Are there any special concerns or research on atmospheric deposition of toxic chemicals from power plants?  
 Not aware of any.
  - b. Are any new regulations aimed at power plants under consideration or recently adopted?  
 Not aware of any.
  - c. Are there any court cases involving power plant effluents or emissions in progress or recently completed?  
 Not at the present time. Wisconsin is in the process of issuing new permits for many plants and expects some court challenges.
4. How many plants have biomonitoring test requirements in their permits?  
 None at present; some new permits will have requirements. Wisconsin is likely to apply whole effluent toxicity limits to some permits.
- a. Will biomonitoring requirements be added to all new permits?  
 A case-by-case review is underway. It is likely that many plants will have biomonitoring test requirements.
  - b. When are samples collected--during periods of chlorination?  
 Most probably plants will be required to collect 24-hour composite samples which would include the 2-hour chlorination.
  - c. Are grab or composite samples collected?  
 Not decided yet but 24-hour composite is likely.
  - d. Will biomonitoring tests require both acute and chronic tests?  
 Not decided yet.

5. Which power plants are on the final 304(l) list?  
None.
- a. What toxic compounds were the basis for the listing of each plant?  
NA.
- b. What are the Individual Control Strategies for the listed plants and have they been implemented?  
NA.

**POWER PLANT TOXICS ISSUES QUESTIONNAIRE**  
**Wyoming**

**1. NAME, POSITION, AND AGENCY**

John Wagner  
Technical Supervisor  
Water Quality Division  
Herschler Building  
4th Floor West  
Cheyenne, WY 82002  
307-777-7082

**2. What toxics discharge criteria are applied to power plants?  
The EPA guidelines.**

- a. Is there a statewide chlorine discharge limit? (For example, MD has a limit of 0.2 ppm for power plants and 0.1 ppm for other facilities).  
Wyoming uses the EPA BAT limit of 0.2 ppm.
- b. What is the chlorine standard for ambient waters?  
0.011 mg/l chronic, and 0.019 mg/l acute.
- c. Are any plants dechlorinating to meet the standard?  
No.
- d. Are any plants using bromine?  
No.
- e. What chemicals are plants typically required to monitor?  
The EPA BAT pollutants.
- f. How frequently are plants required to perform full priority pollutant scans?  
Once every 5 years for permit renewal.
- g. Are plants required to monitor boiler cleaning chemicals?  
If the chemicals are present in the waste stream.
- h. What is the usual frequency for effluent monitoring?  
It varies depending on the size of the plant and the parameter being measured (e.g., chlorine is continuous, total suspended solids is weekly).
- i. Are effluents monitored at the end of the pipe?  
Yes.

3. What toxics issues related to power plants are currently of concern to state regulators?  
None.
- a. Are there any special concerns or research on atmospheric deposition of toxic chemicals from power plants?  
NA.
  - b. Are any new regulations aimed at power plants under consideration or recently adopted?  
No.
  - c. Are there any court cases involving power plant emissions in progress or recently completed?  
No.
4. How many plants have biomonitoring test requirements in their permits?  
One, only one plant discharges into surface water.
- a. Will biomonitoring requirements be added to all new permits?  
No.
  - b. When are biomonitoring samples collected--during periods of chlorination?  
Not sure, probably after chlorination.
  - c. Are grab or composite grab samples collected?
  - d. Will biomonitoring tests require both acute and chronic tests?  
No, chronic only.
5. Which power plants are on the final 304(l) list?  
None.
- a. What toxic compounds were the basis for the listing of each plant?  
NA.
  - b. What are the Individual Control Strategies for the listed plants and have they been implemented?  
NA.

**6. Have Toxicity Reduction Evaluations been conducted at any power plants?**

**None.**

**a. Please describe the major findings. NA.**