

**BEFORE THE  
PUBLIC SERVICE COMMISSION  
OF MARYLAND**

In the matter of the Application of )  
Catoctin Power, LLC for a )  
Certificate of Public Convenience and Necessity ) Case No. 8997  
to Construct a Nominal 600 MW Generating )  
Facility in Frederick County, Maryland )

**DIRECT TESTIMONY OF ROBERT W. KEATING**

1 **Q. PLEASE STATE YOUR NAME, OCCUPATION, AND CURRENT POSITION.**

2 A. My name is Robert W. Keating. I am a hydrogeologist with Environmental  
3 Resources Management, Inc. (ERM) in Annapolis, Maryland. I am a Principal  
4 with the firm. A statement of my educational background, occupational history,  
5 and professional qualifications is appended to this testimony as Appendix A.

6 **Q. DO YOU HOLD ANY PROFESSIONAL REGISTRATIONS?**

7 A. Yes. I am certified as a Professional Geologist in the Commonwealths of Virginia  
8 and Pennsylvania.

9 **Q. WHAT IS ERM’S RELATIONSHIP WITH THE DEPARTMENT OF  
10 NATURAL RESOURCES (DNR) POWER PLANT RESEARCH PROGRAM  
11 (PPRP)?**

12 A. ERM is the Environmental Engineering Integrator (EEI) for PPRP. In this  
13 capacity, ERM provides PPRP with technical expertise in hydrogeology, soils  
14 science, risk assessment, water supply, coal combustion by-product  
15 management, and power plant engineering.

16 **Q. PLEASE DESCRIBE YOUR RELEVANT EXPERIENCE WITH THE EEI  
17 CONTRACT.**

1 A. I have been working on the EEI contract since December 1985. Since then I have  
2 served as the principal hydrogeologist for investigations of ground and surface  
3 water withdrawals and ground water quality impacts associated with power  
4 plant construction and operation. Prior to the Catoctin Power project, I assisted  
5 PPRP in the evaluation of surface and ground water impacts for:

6 1) Mirants' proposed expansion of two combined cycle power plants  
7 at their Dickerson site in Montgomery County;

8 2) Duke Energy's proposed power plant in Frederick County;

9 3) Mirant's installation of four combustion turbines at their Chalk  
10 Point facility;

11 4) The ODEC/Reliant simple cycle project in Cecil County;

12 5) Panda-Brandywine, a combined cycle facility near Brandywine;

13 6) Delmarva Power's Dorchester Unit 1 coal-fired facility in Vienna;

14 7) Southern Maryland Electric Cooperative's combustion turbine  
15 installed at Chalk Point;

16 8) Baltimore and Gas Electric's (BGE) Perryman combined cycle  
17 facility; and

18 9) Potomac Electric Power Company's (PEPCO) Station H project at  
19 Dickerson.

20 In addition, I have served as the Program Manager for ERM's EEI  
21 Contract for the past fourteen years.

22

23 **Q. HAVE YOU TESTIFIED AS AN EXPERT WITNESS IN OTHER MARYLAND**  
24 **PUBLIC SERVICE COMMISSION PROCEEDINGS?**

25 A. Yes, I provided testimony before the Maryland Public Service Commission (PSC)  
26 on behalf of PPRP related to seven separate CPCN proceedings.

1 Q. PLEASE DESCRIBE THE NATURE OF YOUR TESTIMONY IN THOSE  
2 PROCEEDINGS.

3 A. The nature of my previous testimony before the PSC is described below.

4 1) I provided written direct testimony as part of the evaluation of Mirant's  
5 CPCN application to install two combined cycle power plants at their  
6 Dickerson facility (Case 8888). My testimony addressed potential impacts  
7 associated with surface water withdrawal from the Potomac River.

8 2) I provided written direct testimony as part of the evaluation of Mirant's  
9 CPCN application to install four combustion turbines at their Chalk Point  
10 facility (Case 8912). My testimony addressed potential ground water impacts  
11 associated with ground water withdrawal and quality.

12 3) I provided written direct testimony and written rebuttal testimony as part of  
13 the evaluation of ODEC/Reliant's CPCN application to build a simple cycle  
14 facility in Cecil County (Case 8821). My testimony addressed ground water  
15 and surface water impacts to Conowingo Creek, a tributary to the  
16 Susquehanna River, associated with the use of water for the facility.

17 4) I provided written direct testimony as part of PPRP's evaluation of Panda-  
18 Brandywine's Phase II CPCN application to build a combined cycle facility in  
19 Prince George's County (Case 8488). My testimony addressed potential  
20 ground water impacts associated with ground water withdrawal and quality.

21 5) I provided written direct testimony in support of PPRP's evaluation of  
22 Delmarva Power's Dorchester Unit 1 coal-fired plant (Case 8489). My  
23 testimony addressed ground water impacts associated with withdrawal of  
24 ground water and with the landfilling of coal combustion by-products.

25 6) I provided written direct testimony to address PEPCO's request for approval  
26 of power purchase agreements for the purchase of capacity and energy from  
27 Patowmack Power Partners, Inc. and Panda-Brandywine, L.P. (Case 8413).  
28 On behalf of PPRP, I coordinated a multi-disciplinary project team that  
29 conducted a preliminary viability assessment of the two projects to determine

1 whether there were environmental siting, resource, or regulatory constraints  
2 which could preclude project development.

3 7) I provided written direct testimony in both phases of BGE's proposed  
4 application to construct the Perryman combined cycle facility (Case 8241).  
5 My testimony in the Phase I proceedings addressed ground water quantity  
6 and quality impacts from the proposed plant, alternate sites and site  
7 suitability, and water supply issues. My testimony in the Phase II  
8 proceedings, which dealt with the need for the facility, addressed the  
9 preliminary viability of the proposed Cogen Technologies Baltimore, Inc.  
10 (Cogen) cogeneration combined cycle facility as an alternative to BGE's  
11 Perryman project.

12 **Q. WHAT WERE YOUR RESPONSIBILITIES WITH RESPECT TO PPRP'S**  
13 **REVIEW OF THE PROPOSED SURFACE WATER WITHDRAWAL**  
14 **ASSOCIATED WITH THE CATOCTIN POWER PROJECT?**

15 A. On behalf of PPRP, I was responsible for directing ERM's evaluation of the  
16 potential impacts to the Potomac River associated with the proposed surface  
17 water withdrawal, and evaluating the adequacy of Catoctin Power's proposed  
18 approach to comply with the regulations governing consumptive use of surface  
19 water resources in the Potomac River Basin (COMAR 26.17.07). I also directed  
20 and participated in writing the results of the evaluation in the PPRP report titled  
21 *Environmental Review of the Proposed Catoctin Power Project* (DNR Exhibit \_\_ (DHB-  
22 2A)).

23 **Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY IN THIS PROCEEDING?**

24 A. The purpose of my testimony is three-fold:  
25 1) Describe Catoctin Power's proposed use of Potomac River water to  
26 support the combined cycle project;  
27 2) Present the results of our assessment of impacts to surface water resources  
28 and users of those resources associated with Catoctin Power's proposed  
29 surface water withdrawal; and

- 1 3) Present an opinion regarding the adequacy of Catoctin’s proposed  
2 approach to comply with the regulations governing consumptive use of  
3 surface water resources in the Potomac River Basin (COMAR 26.17.07).  
4 4) Present the results of the potential cumulative impacts on water supply  
5 resources in the region from one additional new power plant in the central  
6 Maryland region in addition to the Catoctin Power and Mirant Dickerson  
7 Expansion facilities.  
8

9 In addition, I am sponsoring Sections 6.0 and 7.2 of the PPRP report titled  
10 *Environmental Review of the Proposed Catoctin Power Project* (DNR Exhibit \_\_ (DHB-  
11 2A)).

12 *Proposed Use of the Potomac River*

13 **Q. PLEASE DESCRIBE CATOCTIN POWER’S PROPOSED SOURCES OF**  
14 **WATER FOR THEIR POWER PLANT.**

15 A. Catoctin Power is considering two options for cooling water makeup: 1) use of  
16 reclaimed water from Frederick County’s Ballenger Creek WWTP, supplemented  
17 with potable water purchased from Frederick County to meet shortfalls in  
18 demand for cooling tower makeup; and 2) direct withdrawal from the Potomac  
19 River for cooling tower makeup. Both sources will be supplemented with the  
20 purchase of potable water from Frederick County for other plant water needs. It  
21 is my understanding that Catoctin Power’s and PPRP’s preferred water supply  
22 alternative is use of Frederick County’s reclaimed water. However, Catoctin  
23 Power has been unable to obtain approval from the Frederick County Board of  
24 County Commissioners to use the reclaimed water. Therefore, they have  
25 proposed direct withdrawal from the Potomac River as a secondary alternative.

26 **Q. WHERE WILL CATOCTIN POWER OBTAIN SURFACE WATER TO SUPPLY**  
27 **THE COMBINED CYCLE FACILITY?**

28 A. Catoctin Power’s has proposed to construct, own and operate an intake structure  
29 on the Potomac River, and a pump house and water supply line to withdraw and  
30 convey the river water to the project site. Catoctin Power identified several  
31 alternatives, including two primary alternate pipeline routes and

1 intake/discharge locations. The alternatives are all within several miles  
2 upstream and downstream of the US Route 15 bridge at Point of Rocks.  
3 However, the exact location of the withdrawal is not yet known, but is expected  
4 to be determined after either the National Park Service issues a right-of-way  
5 permit for an easement through the C&O Canal National Historic Park, or  
6 Catoctin Power identifies a route that does not require a right-of-way permit  
7 from the National Park Service.

8 **Q. WHAT ARE THE PROPOSED USES OF SURFACE WATER IN THE**  
9 **CATOCTIN POWER COMBINED CYCLE FACILITY?**

10 A. Catoctin Power has proposed to use water withdrawn from the Potomac River  
11 for makeup in the cooling tower. Re-circulating water will be used in  
12 mechanical draft cooling towers to provide cooling for condensing the steam  
13 turbine exhaust. Water lost from the cooling system through evaporation or  
14 discharge will be replenished using the makeup water withdrawn from the  
15 Potomac River. Additional water requirements, including makeup water for the  
16 inlet air evaporative coolers, makeup water to the heat recovery steam  
17 generator, fire protection water, and plant service and potable water, will be met  
18 using potable water supplied by Frederick County.

19 **Q. HOW MUCH SURFACE WATER IS BEING PROPOSED FOR USE IN THE**  
20 **CATOCTIN POWER COMBINED CYCLE FACILITY?**

21 A. Catoctin Power has indicated that on average, the combined cycle facility will  
22 withdraw 2.43 million gallons per day (MGD) of water from the Potomac River,  
23 and use the water solely for cooling tower makeup. Of this, a total of 2.20 MGD  
24 will be consumed through evaporation or drift from the cooling tower. The  
25 actual withdrawal and consumption will depend on load, the hours of  
26 operation, the number of turbines in operation, and the ambient temperature.  
27 Catoctin Power estimates that the maximum daily withdrawal will be 4.03  
28 million gallons with 3.63 MGD consumed.

29 **Q. WHAT ENTITIES USE THE POTOMAC RIVER DOWNSTREAM OF THE**  
30 **PROPOSED WITHDRAWAL OF THE CATOCTIN POWER COMBINED**  
31 **CYCLE FACILITY?**

1 A. The major users of surface water downstream of the proposed Catoctin Power  
2 withdrawal are Frederick County and three major water suppliers that service  
3 the Washington metropolitan area. Frederick County relies on a withdrawal of  
4 water from the Potomac River to meet a portion of the water supply needs within  
5 the county. Frederick County's river intake is located approximately 3.5 miles  
6 downstream of the US 15 Bridge at Point of Rocks. Frederick County is  
7 authorized by MDE to withdraw a daily average of 16 MGD and a maximum  
8 daily amount of 26 MGD from the County's pump house at New Design Road.  
9 The County is in the process of designing the expansion of the New Design Road  
10 water treatment plant (WTP) from its current treatment capacity of 6.6 MGD to a  
11 future maximum capacity of 25 MGD.

12 Approximately 90 percent of the Washington metropolitan area's population  
13 relies on water furnished by three water suppliers:

- 14 • The Washington Aqueduct Division of the U.S. Army Corps of Engineers  
15 (Aqueduct) serving the District of Columbia and portions of Virginia;
- 16 • The Fairfax County Water Authority (FCWA) serving parts of northern  
17 Virginia; and
- 18 • The Washington Suburban Sanitary Commission (WSSC) serving the  
19 Maryland suburbs.

20 Average flow of the river at Great Falls over a year is about 7,000 MGD; average  
21 summer demand by the Washington area water suppliers that withdraw from  
22 the River is about 500 MGD (7 percent of the average daily river flow). The three  
23 water suppliers cooperate on water supply operations in the Potomac, essentially  
24 operating as one entity. The Washington metropolitan area water suppliers  
25 maintain a portion of the water stored within Jennings Randolph Reservoir, as  
26 well as water impounded within Little Seneca Reservoir in Montgomery County,  
27 to provide for low flow augmentation. Together, these sources of water can  
28 furnish over 17 billion gallons to augment naturally occurring flows in the  
29 Potomac. The Jennings Randolph Reservoir is almost 200 miles upstream of the  
30 water utilities' intakes. Releases from the reservoir take more than a week to  
31 travel to the downstream users during times of low flow.

32

1 *Impacts to the Potomac River and Downstream Users*

2 **Q. HOW DID YOU EVALUATE THE POTENTIAL IMPACT OF CATOCTIN**  
3 **POWER'S PROPOSED WITHDRAWAL ON DOWNSTREAM USERS AND**  
4 **AQUATIC RESOURCES?**

5 A. Our analysis of the potential impacts on downstream users of the Potomac River  
6 was based on a comparison of the amount of Catoctin Power's proposed  
7 consumptive withdrawal to the historic record of measured river flow at Point of  
8 Rocks.

9 **Q. ON WHAT MAJOR SOURCES OF DATA DID YOUR EVALUATION RELY?**

10 A. ERM relied on the data available from the U.S. Geological Survey (USGS)  
11 Potomac River gauging station located at Point of Rocks near the U.S. Highway  
12 15 Bridge. The Point of Rocks gauging station is the closest gauging station on  
13 the river to Catoctin Power's proposed intake structure. There are 108 years of  
14 river stage data for this location. The mean flow for the period 1895 to 1979 was  
15 6,050 MGD (9,362 cubic feet per second, cfs). For this same measuring period,  
16 the lowest average flow during a 7-day period in 10 years (the 7Q10) for the  
17 gauging station was 556 MGD (860 cfs). The historic minimum flow at Point of  
18 Rocks was 342 MGD (530 cfs) measured on September 11 and 12, 1966.

19 **Q. WHAT EFFECT WILL CATOCTIN POWER'S WITHDRAWAL OF**  
20 **POTOMAC RIVER WATER HAVE ON THE QUANTITY OF WATER IN THE**  
21 **RIVER AT POINT OF ROCKS?**

22 A. Catoctin Power's proposed withdrawal will have a minimal effect on the amount  
23 of water in the Potomac River at Point of Rocks. A comparison of the maximum  
24 daily consumptive withdrawal of 3.63 MGD to the mean and low daily flows at  
25 the Point of Rocks gauging station indicates that the withdrawal is a very small  
26 percentage of the historic measured flows in the river. Specifically, the 3.63  
27 MGD consumptive withdrawal is 0.06 percent of the 1895-1979 mean flow of  
28 6,050 MGD, and 0.65 percent of the 7Q10 flow of 556 MGD at Point of Rocks.  
29 The consumptive withdrawal is estimated to lower the river level at Point of  
30 Rocks by 0.01 feet during the 7Q10.

1 Further, Catoctin Power must meet regulatory requirements under COMAR  
2 26.17.07 regarding consumptive withdrawals from the Potomac River during low  
3 flow periods. Under these regulations, Potomac River users must either provide  
4 low flow augmentation (LFA) at a rate commensurate with their consumptive  
5 use, or reduce consumptive use to less than 1 MGD during certain low-flow  
6 periods, as directed by MDE Water Management Administration (WMA).  
7 Catoctin Power has agreed to use two upstream quarries in West Virginia to  
8 provide low flow augmentation to the Potomac River upstream of their  
9 withdrawal. As part of Recommended License Condition 62, (DNR Exhibit \_\_  
10 (DHB-3)), MDE WMA is recommending that Catoctin Power provide low flow  
11 augmentation when flow at the USGS gauge at Point of Rocks drops below the  
12 7Q10 level of 860 cfs (or 556 MGD), or when the ICPRB Co-op orders a release of  
13 water from the water supply storage portion of Jennings Randolph Reservoir.  
14 The amount of water Catoctin Power releases from storage must be equivalent to  
15 the facility's actual consumptive use during the preceding 24-hour period, and  
16 would not be more than the maximum daily consumptive use amount of 3.63  
17 MGD. Thus, the impact to the river level during low flow periods will be even  
18 less than the percentages described previously. The adequacy of Catoctin's  
19 proposed approach to provide LFA is discussed later in my testimony.

20 **Q. WHAT EFFECT WILL CATOCTIN POWER'S PROPOSED WITHDRAWAL**  
21 **OF POTOMAC RIVER WATER HAVE ON THE DOWNSTREAM USERS OF**  
22 **THE RIVER?**

23 A. Catoctin Power's proposed withdrawal will have no measurable effect on the  
24 amount of water available to downstream users of the Potomac River during  
25 normal flows. During low flow conditions, the proposed withdrawal will have a  
26 minimal impact on downstream users because, as discussed previously, Catoctin  
27 Power must meet regulatory requirements under COMAR 26.17.07 regarding  
28 consumptive withdrawals from the Potomac River. To comply with these  
29 regulations, Catoctin Power is required to provide low flow augmentation to  
30 offset their consumptive withdraws during low flow periods. MDE WMA is  
31 recommending that these requirements be met regardless of whether the river or  
32 reclaimed water source is used (DNR Exhibit \_\_ (JWG-1)).

1 During low-flow periods, which MDE WMA has defined in Recommended  
2 License Condition 62 as equal to or below the 10-year, 7-day low flow at the  
3 USGS Point of Rocks Gauging Station of 860 cfs (or 556 MGD), Catoctin Power  
4 will be required to release water from their LFA facility in an amount equal to  
5 their preceding daily consumptive use. Catoctin Power will also be required  
6 under Recommended License Condition 62 to release water from their LFA  
7 facility when the ICPRB Co-op orders a release of water from the water supply  
8 storage portion of Jennings Randolph Reservoir. Thus I believe that requiring  
9 releases from LFA storage based on the threshold value of the 7Q10 at the Point  
10 of Rocks USGS gauge and when water is released from the water supply storage  
11 portion of Jennings Randolph Reservoir is an approach that will adequately  
12 protect the downstream users.

13 Further, it is my understanding that Catoctin Power and the Washington  
14 metropolitan area water suppliers (WAS) have entered into an agreement to  
15 define the terms under which Catoctin Power will store water for LFA storage  
16 and make releases from storage. In accordance with the terms of this agreement,  
17 releases from Catoctin's LFA storage will begin when releases from Jennings  
18 Randolph or Little Seneca reservoirs are made, or when flow at the USGS gauge  
19 (01646500) near the Washington D.C. Little Falls Pumping Station drops below  
20 1,000 cfs at an instantaneous, real-time flow during a calendar day. This action  
21 ensures that Catoctin Power will not consume water that has been released from  
22 upstream reservoirs to meet demand in the Washington metropolitan area  
23 during a drought emergency period. This action will further ensure that the  
24 proposed Catoctin Power combined cycle facility will have no adverse effect on  
25 the adequacy of the existing reservoir system to meet the water supplier's needs.

26 **Q. WHAT EFFECT WILL CATOCTIN POWER'S PROPOSED WITHDRAWAL**  
27 **OF POTOMAC RIVER WATER HAVE ON AQUATIC RESOURCES IN THE**  
28 **RIVER?**

29 A. As indicated in the direct testimony of Dr. Stephen Schreiner (DNR Exhibit \_\_  
30 (SPS-1)), the slight decrease in river stage due to Catoctin Power's consumptive  
31 water use during a low flow condition is not expected to adversely affect the  
32 aquatic habitat and biota in the river. Dr. Stephen Schreiner's testimony also

1 discusses the potential impacts to aquatic biota associated with the intake  
2 structure.

3 *Adequacy of Catoctin Power's Proposed Approach to Comply with*  
4 *Consumptive Use Regulations*

5 **Q. PLEASE DESCRIBE CATOCTIN POWER'S PROPOSED APPROACH TO**  
6 **COMPLY WITH THE POTOMAC RIVER CONSUMPTIVE USE**  
7 **REGULATIONS.**

8 A. Catoctin Power has proposed to meet the consumptive use regulations by  
9 providing LFA storage upstream of the power plant to augment river flow  
10 during low-flow conditions. Further, Catoctin Power committed in their CPCN  
11 application to meet these requirements regardless of the source of water used  
12 because both water sources are derived from the Potomac River Basin.

13 Catoctin Power has identified two potential LFA facilities, namely the Millville  
14 and Old Standard quarries located upstream along the Shenandoah River in  
15 Jefferson County, West Virginia. Each quarry has a sufficient amount of water in  
16 storage to exceed the regulatory requirement of 468 million gallons pursuant to  
17 COMAR 26.17.07.03.C. Catoctin Power will release water from LFA storage to  
18 the Shenandoah River during low-flow periods to offset their daily consumptive  
19 use. As described previously, under the terms of Catoctin Power's agreement  
20 with WAS releases from storage will occur either when flow at the USGS gauge  
21 at the Little Falls Pumping Station drops below 1,000 cfs, or when releases from  
22 the water supply storage portion of Jennings Randolph or Little Seneca reservoirs  
23 are made.

24 Catoctin Power is proposing to measure the amount of water released from  
25 storage in either quarry by measuring the change in water level associated with  
26 one day of augmentation, as well as measuring total flow released using a flow  
27 totalizing flow meter or pump curves.

28 **Q. WHAT HAVE YOU CONCLUDED ABOUT CATOCTIN POWER'S**  
29 **PROPOSED APPROACH TO COMPLY WITH THE POTOMAC RIVER**  
30 **CONSUMPTIVE USE REGULATIONS?**

1 A. I agree with Catoctin Power’s overall approach to meet the consumptive use  
2 regulations. In my opinion, either quarry has sufficient capacity to provide the  
3 468 million gallons of LFA storage, as required in COMAR 26.17.07.03.C. This  
4 volume of water storage should be adequate to support the number and  
5 frequency of potential releases that may be required to be released from storage  
6 based on recent and long-term history of river flow. The calculated amount of  
7 storage is sufficient such that releases from storage in the amount equivalent to  
8 the maximum daily consumptive use of 3.63 MGD could be made for 129 days in  
9 any given year, which roughly corresponds to the July through October period  
10 when river flow could be the lowest.

11 However, the adequacy of the amount of long-term LFA storage needs to  
12 consider both the growth in demand for Potomac River water over time, coupled  
13 with the potential to experience a drought of greater magnitude than those  
14 measured in the Potomac River over the past 108 years. Therefore, in my  
15 opinion it would be appropriate for MDE Water Management Administration to  
16 reevaluate the amount of LFA storage required during the 12-year appropriation  
17 renewal.

18 The technical analysis supports MDE WMA’s recommendation that Catoctin  
19 Power release water from either of the two low flow augmentation storage  
20 facilities to the Shenandoah River in an amount equivalent to the preceding day’s  
21 consumptive use. Releases would occur when the Potomac River water level at  
22 the USGS Point of Rock Gauging Station (01638500) is at or below the 10-year, 7-  
23 day low flow of 860 cfs (or 556 MGD) at an instantaneous, real-time flow during  
24 a calendar day, or when the ICPRB Co-op orders a release of water from the  
25 water supply storage portion of Jennings Randolph Reservoir (Condition No. 62,  
26 DNR Exhibit \_\_ (DHB-3)). Although Catoctin Power is entering into an  
27 agreement with WAS that will determine when releases from LFA occur, the  
28 historic Potomac River flow data indicate that MDE’s recommended license  
29 condition will most likely require Catoctin Power to release water from LFA  
30 storage on the same days that the WAS agreement will require a release from  
31 storage.

32

1 Q. HAVE YOU IDENTIFIED ANY UNCERTAINTIES ASSOCIATED WITH  
2 CATOCTIN POWER'S PROPOSED APPROACH TO COMPLY WITH  
3 POTOMAC RIVER CONSUMPTIVE USE REGULATIONS? IF SO, WHAT  
4 ARE THE UNCERTAINTIES?

5 A. Yes, although I agree with Catoctin Power's overall approach to meet the  
6 consumptive use requirements, I believe there are near-term uncertainties  
7 associated with their proposed LFA approach that need to be resolved prior to  
8 using the quarries for low-flow augmentation storage. These near-term  
9 uncertainties include: 1) the ability to accurately measure drawdown in the  
10 Millville Quarry during low flow augmentation; 2) the ability to account for the  
11 potential loss or gain of quarry water to the surrounding geologic formation at  
12 the Millville Quarry; and 3) the potential impact of water quality concerns in the  
13 Old Standard Quarry will have on the ability to discharge the water into the  
14 Shenandoah River.

15 In addition, as previously mentioned, there is long-term uncertainty associated  
16 with whether 468 million gallons of storage is adequate during the lifetime of the  
17 power plant because of a growth in water demand and the potential to  
18 experience more severe droughts.

19 Q. WHAT MEASURES DOES PPRP AND MDE WMA RECOMMEND BE  
20 TAKEN TO ALLEVIATE THE UNCERTAINTIES ASSOCIATED WITH  
21 CATOCTIN POWER'S PROPOSED APPROACH TO COMPLY WITH  
22 POTOMAC RIVER CONSUMPTIVE USE REGULATIONS?

23 A. MDE WMA and PPRP recommend that the near-term uncertainties be resolved  
24 prior to the initiation of withdrawal of water from the Potomac River, or the use  
25 of reclaimed water from Frederick County, through the conduct of several  
26 studies as described in Recommended License Conditions 63, 64 and 66. These  
27 studies will provide the following information:

- 28 • The ability to accurately measure drawdown in the Millville Quarry  
29 during low flow augmentation because of the extensive pumping that  
30 occurs at the quarry on a daily basis so that the operator can maintain the  
31 water level in the quarry;

- 1 • The ability to account for the potential loss or gain of quarry water to the  
2 surrounding geologic formation at the Millville Quarry; and
- 3 • The potential impact that the presence of tetrachloroethylene or PCE in  
4 the Old Standard Quarry will have on the ability to discharge the water  
5 into the Shenandoah River.

6 MDE WMA and PPRP recommend in Recommended License Condition 70 that  
7 long-term uncertainty associated with the adequacy of the amount of LFA  
8 storage be resolved through the reevaluation of the amount of storage needed  
9 every 12 years using updated information relative to water demand and river  
10 flow.

11 **Q. HAVE YOU EVALUATED POTENTIAL CUMULATIVE IMPACTS OF**  
12 **MULTIPLE POWER PLANTS IN THE CENTRAL MARYLAND REGION?**

13 A. Yes, I evaluated potential cumulative impacts on water supply resources in the  
14 region from one additional new power plant in the central Maryland region in  
15 addition to the Catoctin Power and Mirant Dickerson Expansion facilities.

16 For the purposes of evaluating the maximum daily consumptive withdrawals, I  
17 assumed that the Catoctin facility will consume a maximum of total of 3.6 million  
18 gallons per day (MGD) and the Mirant facility will consume a maximum of 8.3  
19 MGD. An additional hypothetical plant in the vicinity of the Catoctin Power  
20 facility was assumed to consume a maximum of 6.1 MGD for a total of 18 MGD  
21 consumption associated with the three electric power consumptive users. Based  
22 on these assumptions, I concluded that even under a drought scenario (flows are  
23 based on the 7Q10 value), the change in river stage would be less than two-tenths  
24 of an inch at Point of Rocks and slightly more than one-tenth of an inch at Little  
25 Falls. Under higher flow conditions, the change in stage would be less than  
26 during these worst-case low flow conditions.

27 This analysis is considered worst-case because the reduction of the cumulative  
28 withdrawals on the availability of water in the Potomac River and downstream  
29 users would be ameliorated through compliance with Maryland's consumptive  
30 use regulations. Under these regulations, withdrawals from the Potomac for  
31 each power plant during periods of low flow would be limited to less than 1

1 MGD, or the power plants would need to release water from an upstream low  
2 flow augmentation storage facility to offset their consumptive use. Mirant  
3 Dickerson is proposing to curtail withdrawals from the Potomac River to 1 MGD  
4 and offset the reduction in water by storing water in on-site tanks or operating  
5 the power plant in the simple cycle mode. Catoctin Power is proposing to release  
6 water from an upstream quarry being used as a low flow augmentation storage  
7 facility, and will operate the power plant at full load during low flow periods.

8 **Q. WHAT ARE THE RESULTS OF THE CUMULATIVE IMPACT ASSESSMENT**  
9 **FOR WATER RESOURCES DUE TO MULTIPLE PLANTS IN CENTRAL**  
10 **MARYLAND?**

11 A. The expected impact of one power plant would be negligible and the combined  
12 impact of three power plants curtailed to 1 MGD of withdrawal each during low-  
13 flow periods or releasing augmentation water, would be less than the impacts  
14 described above for one power plant not subject to curtailment of withdrawals  
15 during low-flow periods. Therefore, the impact of three power plants on  
16 downstream Potomac River users is not expected to affect the ability of the water  
17 suppliers to meet regional water demands given the limitations imposed by  
18 Maryland's consumptive use regulations.

19 **Q. DOES THIS CONCLUDE YOUR TESTIMONY?**

20 A. Yes, it does.

*Appendix A*

*Statement of Qualifications*

## APPENDIX A

### STATEMENT OF QUALIFICATIONS FOR

#### ROBERT W. KEATING

##### *Experience Summary*

Robert W. Keating has 20 years of experience with Environmental Resources Management, Inc. (ERM) in planning, implementing, and managing hydrogeologic investigations. In 1996, Mr. Keating was elected as a Principal with ERM. For the past 19 years, Mr. Keating has provided management and technical support to Maryland Power Plant Research Program (PPRP) for evaluating engineering and hydrogeologic issues associated with electric power generation. ERM has been the Environmental Engineering Integrator (EEI) for PPRP since 1984. Mr. Keating also serves as ERM's Program Manager for the EEI contract. His fields of expertise include hydrogeology, hazardous waste site investigation and remediation, environmental analysis of power generation and transmission facilities, evaluation of ground water and surface water withdrawal impacts, and evaluation of the environmental effects of coal combustion by-product disposal and beneficial use.

##### *Relevant Experience*

Relevant experience related to the evaluation of ground and surface water withdrawal and quality impacts associated with power generation includes the following:

- Evaluation of impacts associated with surface water withdrawal from the Potomac River associated with Mirant's CPCN application to install two combined cycle power plants at their Dickerson facility;

- Evaluation of impacts associated with the proposed ground water appropriations for Mirant Chalk Point Development's simple-cycle facility in Prince Georges County;
- Evaluation of impacts associated with the proposed ground and surface water appropriations for ODEC/Reliant's simple-cycle facility in Cecil County;
- Evaluation of the cost and technical feasibility of water supply alternatives for BGE's proposed Perryman combined cycle facility;
- Technical direction for the evaluation of ground water quality and quantity impacts associated with Delmarva's proposed Dorchester 1 coal-fired facility near Vienna;
- Evaluation of ground water quality and quantity impacts associated with Panda-Brandywine's proposed appropriation for their combined-cycle facility in Prince George's County;
- Evaluation of potential surface water quality impacts to the Potomac River associated with the baseflow discharge of a contaminant plume derived from a former industrial landfill site near Cumberland, MD; and
- Evaluation of potential surface water quality impacts to the South Fork Shenandoah River associated with the baseflow discharge of a contaminant plume derived from a former industrial facility in Front Royal, VA.

#### *Education*

B.S., Geological Sciences, Lehigh University, January 1982

M.S., Geology, Lehigh University, October 1983

*Professional Affiliations and Certifications*

Certified Professional Geologist in the Commonwealth of Virginia (No. 722)

Professional Geologist in the Commonwealth of Pennsylvania (No. 1813)

Association of Ground Water Scientists and Engineers - NGWA

*Depositions and Expert Testimony*

Filed written expert testimony before the Maryland PSC on nine separate occasions and participated in oral cross examination on seven separate occasions on behalf of the Department of Natural Resources Power Plant Research Program, as follows:

- PSC Case 8912, Mirant Chalk Point Development's application for a simple cycle power plant, filed written direct testimony and participated in cross examination;
- PSC Case 8888, Mirant's application to install two combined cycle power plants at their Dickerson facility, filed written direct testimony and participated in cross examination;
- PSC Case 8821, ODEC/Reliant's application for a simple cycle power plant, filed written direct testimony and participated in cross examination;
- PSC Case 8821, ODEC/Reliant's application for a simple cycle power plant, filed written rebuttal testimony and participated in cross examination;
- PSC Case 8489, Delmarva Power's Dorchester 1 coal-fired power plant, filed written direct testimony;
- PSC Case 8488, Panda-Brandywine's Phase II application for a combined cycle power plant, filed written direct testimony and participated in cross examination;
- PSC Case 8413, PEPCO's request for approval of power purchase agreements, filed written direct testimony and participated in cross examination;

- PSC Case 8241, BGE's Phase I application for the Perryman combined cycle power plant (environmental impacts), filed written direct testimony; and
- PSC Case 8241, BGE's Phase II application for the Perryman combined cycle power plant (facility need), filed written direct testimony and participated in cross examination.

Testimony as an expert and fact witness before an arbitrator, and testimony as an expert witness before a jury, on behalf of Eastman Kodak Corporation in JBG/JER Shady Grove LLC vs. Eastman Kodak Company, in the Circuit Court for Montgomery County, Maryland, re: environmental conditions at the 1 Choke Cherry Road property. October and December 2001, September 2003.

Filed expert report and provided a deposition on behalf of Hoechst Celanese in Hoechst Celanese Corporation vs. Aetna Casualty & Surety Company, et al., in the Circuit Court for Baltimore City, re: cost recovery for remediation of ground water contamination. January 2000.

Filed expert report in General Circuits Incorporated and GCI Holdings Corp., David R. Kittay, As Trustee, versus G.S. Myers and Co., Inc. and Glenn S. Myers, re: source and extent of VOC contamination in ground water at a printed circuit board manufacturer. June 1998.

Filed expert report on behalf of a mediator in a civil action to determine the contribution of surrounding property owners to a VOC plume emanating from a commercial landfill for a New Jersey Superfund Site. January 1998.

Deposition in Douglas Oil Company of California, et al., versus Allianz Versicherungs Aktiengesellschaft, et al. re: remedial investigation conducted at a chemical plant. January 1997.

Deposition in General Circuits Incorporated and GCI Holdings Corp., David R. Kittay, As Trustee, versus BICC Cables Corporation, re: source and extent of VOC

contamination in ground water at a printed circuit board manufacturer. November 1995.