

FACT SHEET
NPDES PERMIT REISSUANCE
WASHINGTON AQUEDUCT WATER TREATMENT PLANT
WASHINGTON, DC
March 27, 2002

1. NPDES Permit Number: DC0000019

2. Issuing Office: U.S. Environmental Protection Agency
Region III
Office of Watersheds
MD/DC Branch (3WP13)
1650 Arch Street
Philadelphia, PA 19103

Permit Writer: Mary Letzkus (215-814-2087)

3. Facility Name: Washington Aqueduct
Department of the Army
Baltimore District, Corps of Engineers
5900 MacArthur Boulevard, NW
Washington, DC 20315

Contact Person: Thomas P. Jacobus (202-764-0031)

In addition to the Facility listed above, the term permittee for the purpose of this Fact Sheet and permit includes the following customers of the Aqueduct: District of Columbia Water and Sewer Authority, Falls Church City Government and Arlington County Government.

4. Overview:

The United States Environmental Protection Agency has made a tentative determination to reissue a permit for the discharge from the Washington Aqueduct, described in the application. Permit requirements are based on the Clean Water Act (33 U.S.C. 1251 et seq.), hereafter referred to as the Act, and NPDES regulations (40 C.F.R. Parts 122 and 124).

The permit will become effective 30 days after the final determinations are made and the requirements of the Clean Water Act Sections 401 and 402 are met. Requests for an evidentiary hearing after final permit issuance must comply with the procedures of the Clean Water Act governing the issuance of NPDES permits.

Upon publication of the public notice and this fact sheet, a public comment period shall begin. During this period, any interested persons may submit written comments on the draft permit to the EPA contact listed above. All persons wishing to comment on any condition of this draft permit, or the Director's tentative decision to issue this permit, must raise all reasonable

arguments supporting their position on or before the public notice expiration date. All comments should include the name, address, and telephone number of the commenter and a concise statement of comment and the relevant fact upon which it is based. A request for a public hearing can be made during this comment period.

After the expiration date of the public notice, EPA will make final determinations with respect to the permit issuance. The tentative determinations contained in the draft permit will become final conditions if no substantive comments are received during the public notice period.

Copies of the permit and the fact sheet will be available for pick-up at the EPA office in Philadelphia Monday through Friday during normal business hours. Copies will also be mailed as requested in writing or by phone call to the address and telephone number listed previously.

A copy of the draft permit will also be available on the website of the Washington Aqueduct. The address is: <http://washingtonaqueduct.nab.usace.army.mil>

In addition, a copy of the draft permit, fact sheet, permit application and technical reference materials will be available for inspection and copying at the Martin Luther King, Jr., Memorial Library at 901 G Street N.W., Washington, D.C.

Concurrently with the Public Notice of this permit, the EPA is formally requesting State Certification of the permit, as required by Section 401(a)(1) of the Act, and 40 C.F.R. 124.53. The final permit will contain any condition required by the District of Columbia as a condition for Certification.

The NPDES permit for the Washington Aqueduct (WA) expired in 1994. Its terms and conditions continue in effect based upon the Corps of Engineer's timely application for a renewed permit. Since that time, EPA has worked with many interested parties to write a permit that complies with the Clean Water Act (CWA) and federal NPDES regulations. In 1995, EPA circulated a draft permit which proposed strict limits on the concentrations of iron, aluminum and total suspended solids (TSS) in the Washington Aqueduct effluent.

The discharge of the aluminum bearing sediments to the Potomac River takes place at three outfalls identified throughout this permit as Outfall 002, Outfall 003 and Outfall 004. Outfall 002 is the discharge point for the four sedimentation basins located at Dalecarlia. Outfalls 003 and 004 are the discharge points for the two sedimentation basins located at Georgetown. At both locations, e.g., Georgetown and Dalecarlia, the liquid portion of the basin is decanted first in a process that takes anywhere from 4 hours for the smallest basin to 12 hours for the largest basins. This decant is followed by a release of the solid portion of the discharge which consists of sediment, aluminum sulfate and organic material that was present in the raw water. The release of the solids is assisted by flushing the basins with hosed water. At Dalecarlia, finished water is used, which may contain chlorine. At Georgetown, raw river water that does not contain chlorine is used for flushing. It is this practice of removing the solids and cleaning the basins that is the subject of EPA technology- based and water quality-based

regulations under the Clean Water Act (CWA).

The technology-based conditions expressed in the 1995 permit were based upon a survey of technologies used by other water treatment plants in Region III. The 1995 permit based effluent limits on dewatering and off-site transport of the sediment as the Best Conventional Technology (BCT). The 1995 permit piqued considerable interest by environmental groups, citizens living in the area of the Dalecarlia Water Treatment Plant, Congress, the municipal authorities who purchase water from the Aqueduct (Customers) and users of the Potomac River who identified significant issues regarding how the effluent limits were derived. Please see Section 8B below for further discussion of the public reception of the 1995 permit.

At the request of Congress, EPA delayed issuance of the 1995 permit and agreed to work closely with the Customers to resolve a number of scientific, legal and administrative issues relating to the permit. During this time, EPA, the Corps of Engineers (which operates the WA), and the Customers agreed to perform a scientific study (*Water Qualities Study*) to evaluate the effect of the sediment discharges upon the Potomac River. The results of the *Water Qualities Study* are important to understanding the toxicity of the discharge, the dynamics of sediment release and its effects upon the Potomac River, and were intended to be used to establish water quality based limits for the permit. (Please refer to Section 8 below for an explanation of how EPA derives NPDES permit limits).

Also during this time, EPA commissioned a panel of fisheries experts to provide recommendations to minimize the impacts of the sediment discharges upon migratory fish in the Potomac. During the pendency of the panel's work, EPA was apprized that the endangered shortnose sturgeon is present in the lower and middle reaches of the Potomac River. EPA acted upon this information by initiating informal consultation with the National Marine Fisheries Service (NMFS).

As a result of the work of the Fisheries panel and the *Water Qualities Study*, EPA came to realize that protecting the spawning season is the single most environmentally sensitive issue confronting this permit. In writing this permit, EPA has focused upon using the information contained in the *Water Qualities Study* and the recommendations of the Fisheries Panel to protect the most sensitive life stages of aquatic species while looking for long term solutions to reduce or remove the solids discharge to the Potomac River.

In its deliberations regarding the draft permit, EPA considered the following legal, regulatory, voluntary and political issues which are unique to the Potomac watershed in which this facility exists.

- The Washington Aqueduct and its associated outfalls are located on historic land which must be protected;
- While it does not produce any sediment of its own, the Washington Aqueduct serves as a sediment trap (similar to the Conowingo Dam on the Susquehanna River) for the Chesapeake Bay;
- A substantial rate increase is likely to be placed upon the water and sewer rate

payers in the District of Columbia during the life of this permit. To avoid paying for parallel and possibly unnecessary technologies, in its long term planning for this facility EPA has attempted to integrate costs associated with required wet weather controls in a document called the Long Term Control Plan (LTCP) and new water treatment program improvements (EPA's new disinfection and disinfectant by-products rules) in its plan for controlling the Aqueduct discharges;

- Chesapeake Bay 2000 Agreement; and
- Potomac River Total Maximum Daily Load and Water Quality Task Force.

5. Strategic Plan for Addressing the Aqueduct's Sediments

Reducing the sediment discharges from the Washington Aqueduct are part of a much larger sediment load problem in the Potomac River and Chesapeake Bay and must be viewed in that context. The discharged sediments, apart from the aluminum sulfate (alum) added by the Aqueduct, are not contaminants or pollutants that are added by the permittee as part of the water treatment process, rather, they are pumped into the plant with the raw Potomac River water that is treated to become drinking water. This means that controlling the amount of sediment load upstream of the Aqueduct's intakes will have an affect upon the amount of sediment that is discharged back into the Potomac. Controlling upstream sources of contaminants, including TSS and metals is a mandate for several large environmental programs including EPA's Total Maximum Daily Load program; the Chesapeake Bay Agreement and companion tributary strategies undertaken by the states of Maryland, Virginia, West Virginia and Pennsylvania; improvements in river water quality which result from the implementation of upstream MS4 permits; and stream bank restoration and reforestation projects which are underway by environmental organizations such as the Potomac Conservancy.

Other opportunities for sediment control are offered by EPA's wet weather control programs, most notably the National Combined Sewer Overflow (CSO) Control Strategy. The CSO Strategy requires that municipalities, including the District of Columbia, and large municipalities upstream of the District, prepare and implement their LTCPs. Once approved, EPA is required to incorporate LTCP improvements into NPDES permits. The District of Columbia Water and Sewer Authority (WASA) is in the process of complying with this requirement and it submitted a preliminary draft LTCP to EPA in June of 2001.

One of the remedial alternatives proposed in the District's 2001 draft LTCP is the installation of a large storage tunnel from Georgetown to the Potomac Pumping Station. The proposed upper reach of this storage tunnel is approximately 1.25 miles from the Georgetown Reservoir. The significance of the tunnel construction in the discussion of the Washington Aqueduct solids disposal is its potential use for storage of Aqueduct solids and as a conveyance of the solids to a disposal site. Although it is not known how much of the proposed \$1.05 billion cost of the LTCP will be paid by the residents of the District of Columbia, it is clearly understood that the residents of the District will pay a share of the costs which they will see as increases in individual and business water and sewer rates.

The intent of this permit cycle, and possibly future permits, is to manage the sediment releases to protect the fisheries, monitor the health of the river system and establish a plan for the phased construction of affordable engineered improvements to significantly decrease or eliminate the Washington Aqueduct's sediment bearing effluent load to the Potomac until such time that a permanent solution is developed. At the same time, the upstream riparian improvements and other programs should reduce the sediment load (which will also decrease the amount of sediment released from the Aqueduct). In order to achieve the above, EPA has attempted to write this permit in such a way that it imposes no conditions that will trigger the expenditure of funds for equipment or improvements at the Aqueduct that will either be redundant or unnecessary by the time they are built.

6. Brief Overview of this Action:

The 2002 proposed permit focuses on four areas, 1) technology based controls, 2) water quality based controls, 3) management of the sediment discharge and 4) new fisheries studies. The technology based portion of the proposed permit allows credit to the Washington Aqueduct for the approximately 51% of the solids it removes from the Dalecarlia Reservoir and are subsequently dredged and land applied offsite. They are never returned to the Potomac River. The technology based portion of the permit also requires the permittee to perform an analysis of alternatives to increase the amount of sediment removed from the present 51% to 85% removal. This analysis must include engineering alternatives, costs and a proposed schedule for implementation for each of the options. The permittee is further required to choose a preferred option, a schedule for implementation and implementation of this option.

The water quality based controls recognize the results of the two scientific studies (Dynamac, 1993 and EA, 2001) which demonstrate that the sediment discharges have a negligible affect upon the Potomac River. The permit allows the permittee to release the aqueous and the sediment portions of the discharge at lower river flows, in order to provide the ability to meet the prohibition on discharge during spawning season.

In recognition of the potential sensitivity of early life stages of fin fish to these sediment discharges, this draft permit provides for the strict management of the sediment releases to the Potomac River. These management controls include, but are not limited to, the prohibition of discharge during the spawning season, except in the event that emergency repairs must be made to the equipment, and for the Georgetown basins an increased solids release time and doubling of the amount of raw river water used to flush the basins.

The draft permit provides for the completion of a gill net study, which is to be overseen by the National Marine Fisheries Service (NMFS), to determine if the endangered shortnose sturgeon is present in this reach of the Potomac River.

In order to accomplish the goals of this permit, EPA is mindful of the expenses that will be incurred to achieve them. The means to finance any improvements at the Aqueduct is through

increases in the cost of the drinking water, which will ultimately be borne by the consumers of the water. We also note that these expenses would be concomitant with a request to the residents to pay for the LTCP projects through increased water and sewer bills.

Considering the above, US EPA Region III, the NPDES permitting authority for the District of Columbia, proposes to reissue a National Pollutant Discharge Elimination System (NPDES) permit to the Department of the Army, Baltimore District, Corps of Engineers and its wholesale customers the District of Columbia Water and Sewer Authority, Falls Church City Government and Arlington County Government for the Washington Aqueduct. This permit modifies the following conditions of the Aqueduct's existing NPDES permit:

- Combines former permit numbers DC000329 and DC0000019. Public notice is also hereby being given regarding the termination of old permit DC0000329;
- Adds a new monitoring requirement for chlorine in the discharge of the Dalecarlia sedimentation basins and treated water blowoff through outfalls 002, 006 and 007. Since chlorinated water is not used to flush the Georgetown sedimentation basins, monitoring for chlorine at Georgetown is not required;
- Permittee may not discharge from Outfall 002, which is the discharge point for the Dalecarlia sedimentation basins, during the Spring Spawning Season which is defined as February 15 through June 15 each year, except as noted below, for the purpose of emergency maintenance. From June 16 through February 14 each year, permittee may discharge the Dalecarlia sedimentation basins when the Potomac River flow is 800 million gallons per day or greater;
- Permittee may not discharge from Outfalls 003 or 004, which are the principal discharge points for the Georgetown sedimentation basins, during the Spring Spawning Season which is defined as February 15 through June 15 each year. From June 16 through February 14 each year, permittee may discharge the Georgetown sedimentation basins to the Potomac River when the river flow reaches 1500 million gallons per day or greater. In addition, permittee shall increase the amount of time for draining the liquid portion of the discharge from the present 12 hours to 15 hours. The amount of time for flushing the sediments shall be increased from the present 4 hours to 8 hours. In addition, the permittee shall double the amount of raw river water used to flush and clean the Georgetown sedimentation basins.
- In the event that emergency repairs are necessary at either the Georgetown or Dalecalia sedimentation basins, the permittee must notify EPA of the need for such a release and no release may occur until EPA has approved the emergency release. Examples of emergency maintenance which may trigger an emergency release include maintenance of any pumps, pipes, basins, valves or other

appurtenances at Dalecarlia or Georgetown during the Spring Spawning Season.

- The basis for Technology-based limits and conditions is Best Conventional Control Technology (BCT) which is applicable to the Total Suspended Solids (TSS) and Best Available Technology (BAT) for aluminum and iron. The Best Professional Judgement (BPJ) analysis for BCT and BAT in this permit allows credit for the approximately 51% solids removal already achieved by sedimentation in the Dalecarlia Reservoir. In addition, this permit requires completion of a conceptual study plan designed to identify additional engineering controls capable of achieving an additional 34% reduction in incoming solids. Please refer to section 7 for further discussion of EPA derived BPJ limits;
- The basis for Water Quality-Based Effluent Limits and conditions are the 1993 Dynamac Study and the 2001 Water Quality Study performed by EA Engineering and Sciences, LTD. These studies show that the aluminum bearing sediment is neither acutely nor chronically toxic to fish, however, during the spring spawning season there may be smothering of young species if they happen to be in the water column at the time of the discharge. This permit has a strict prohibition of sediment discharge during the Spring spawning season;
- The draft permit updates the administrative penalty provisions;
- Adds a requirement to submit Discharge Monitoring Reports to the U.S. Fish and Wildlife Service (FWS) and National Marine Fisheries Service (NMFS) so discharges can be evaluated for the effect, if any, on endangered species;
- Requires development and implementation of a Best Management Practices Plan. This requirement is carried over from old permit DC0000329;
- Within 3 months of the effective date of the permit, permittee shall submit a report to EPA and DC DOH which details, the consultants and stakeholders who will assist in the development of the Preferred Analysis Plan. This report will identify the engineering options that will be evaluated in the plan;
- Within 24 months after the effective date of the permit the permittee shall submit to EPA and the DOH a Preferred Analysis Plan (PAP) which details the engineered options considered to achieve 85% removal of solids, preliminary cost estimates and an estimate of the amount of time to implement each option. The PAP shall also include a preferred option and costs of construction and a schedule for implementation of that option;
- In the event that implementation of the PAP triggers action under the National Environmental Policy Act (NEPA), permittee shall use its best efforts to meet all

the requirements of NEPA, including public participation, final design and initiate construction no later than 5 years after the effective date of this permit;

- Permittee shall apply for a permit from the National Park Service (NPS) to remove all rocks from the vicinity of Outfall 002 which impede the flow of effluent from that outfall. Once the permit is received, permittee shall remove the rocks and implement a program to inspect and remove additional rocks which may impede flow of effluent to the Potomac River;
- Adds a requirement to perform a comprehensive study, using NMFS protocols, to determine the presence of shortnose sturgeon in the upper tidal Potomac River;
- The permittee shall redesign each of the outfalls which are located on public land to improve lower visual profiles and improve the aesthetic quality of each outfall and secure any additional required permits from NPS.

7. Consultation with the US Fish and Wildlife Service and National Marine Fisheries Service

EPA is required to consult under Section 7(a)(2) of the Endangered Species Act (ESA) regarding issuance of an NPDES permit that may affect any federally listed endangered or threatened species. EPA has initiated informal section 7 consultation with the United States Fish and Wildlife Service (FWS) and the National Marine Fisheries Service (NMFS) regarding this action. FWS has informed EPA that no federally proposed or listed endangered or threatened species under their jurisdiction are known to exist within the boundaries of the proposed federal action area and that, therefore, no further consultation with FWS is required for this permit.

The NMFS has indicated that the endangered shortnose sturgeon occurs in the Potomac drainage and may occur in the vicinity of the Aqueduct discharge outfalls. In addition according to NMFS, the habitat in the vicinity of the Washington Aqueduct outfalls is similar to other spawning areas favored by the shortnose sturgeon in other rivers. NMFS and EPA are currently in consultation under section 7 of the Endangered Species Act (ESA) to determine the effects of the action on shortnose sturgeon.

The Region has prepared a draft biological evaluation and is submitting it to NMFS when the Region issues the public notice for this draft permit. EPA's biological evaluation has concluded that, based on the best available information, permitted discharges from this facility are not likely to adversely affect the sturgeon, and EPA has requested that NMFS concur in this finding. NMFS will use the biological evaluation in its consultation on the action. If NMFS concurs in EPA's finding, consultation will be concluded. If NMFS does not concur, then the agencies will enter formal consultation. See 50 C.F.R. 402.14. Through this consultation process, the Region will ensure that a permit ultimately issued is in compliance with the ESA.

In any event, the Region has already taken a conservative approach to protecting against

any unknown effects of the discharge by prohibiting discharges (except for emergency conditions) during the spawning season, allowing lower minimum flow requirements for discharges during other times of the year than allowed by the terms and conditions of the expired permit under which the Aqueduct is currently operating (This permits the discharge to take place outside then spawning season.), and requiring the permittee to carry out a gill net study supervised by NMFS to look for the presence of sturgeon in the vicinity of the discharges. The draft permit also provides for submission of Discharge Monitoring Reports to the Services.

8. Background - NPDES Program

A. General - All facilities which discharge pollutants from any point source, e.g., a pipe or outfall, into the waters of the United States are required to obtain an NPDES permit. The national NPDES program addresses pollutant discharges from several types of sources, including industrial sources. EPA is responsible for developing effluent discharge guidelines for industrial categories, which includes the drinking water source category, however, EPA has never finalized the effluent discharge guidelines for that category. For facilities where EPA has never finalized effluent discharge guidelines, technology based permit limits are developed using the permit writer's "best professional judgement"(BPJ).

A major step in the development of an NPDES permit is the derivation of technology-based effluent limits. Following this step, the permit writer derives effluent limits that are protective of the State water quality standards. The permit writer then compares the technology-based limits with the water quality based limits and applies the more stringent limits in the NPDES permit. A permit may contain both technology-based and water quality based limits in the same permit but for different pollutants.

There are two general approaches for developing technology-based effluent limits for industrial facilities: (1) using national effluent limitations guidelines (ELGs) and (2) using BPJ on a case-by-case basis, in the absence of ELGs. The intent of technology-based effluent limitations is to require a minimum level of treatment for point sources based upon currently available treatment technologies while allowing the discharge to use any available control technique to meet the limitations.

For industrial sources, the national ELGs are developed based on the demonstrated performance of a reasonable level of treatment that is within the economic means of specific categories of industrial facilities. Where national ELGs have not been developed, the same performance-based approach is applied to a specific industrial facility based on the permit writers BPJ.

In the development of BCT/BAT requirements in the effluent guidelines for industrial facilities, NPDES personnel look for technologies that are capable of meeting 80% to 90% removal efficiency. Since 80% to 90% removal is required for the development of effluent guidelines, then that amount is appropriate for BPJ limits in the absence of effluent guidelines.

Current calculations performed by the Corps show that the settling out of solids in the Dalecarlia reservoir, along with the periodic dredging of the reservoir show an overall removal of 51% solids. This means that the Corps needs a minimum of 29% additional removal to meet the minimum acceptable level to achieve Best Practicable Technology (BPT). BPT in this case is determined to be using the Dalecarlia Reservoir for preliminary sedimentation and periodic dredging of the Reservoir to remove the solids.

Once BPT is determined, it is then necessary to determine the increment necessary to achieve BAT or BCT. About 53 cents per gallon in 1995 dollars above the cost of BPT is allowed in order to install the necessary equipment to achieve BCT. Another constraint is that the cost of BCT cannot be more than 40% above the cost of BPT. Procedures for determining BCT are given in the Federal Register at 51 FR 24974.

The engineering study required by the permittee will help identify the additional measures, their costs and schedule for implementation to achieve BAT/BCT to achieve at a minimum 80% solids removal.

B. Applying the Statute and Regulations to the Washington Aqueduct. In the case of the NPDES permit for the Washington Aqueduct, in 1995, EPA wrote but never public noticed, a draft permit for this facility. That draft permit contained technology based limits which would have required treatment meeting BCT for total suspended solids and BAT for total iron and aluminum.

As EPA has not developed guidelines for BCT or BAT for water treatment plants, permit limitations in the draft 1995 permit were developed using BPJ. In accordance with the regulations found at 40 C.F.R. Section 125.3(d)(2), BPJ limitations for BCT (for TSS) are to be determined by considering the following factors:

- The reasonableness of the relationship between costs of attaining a reduction in effluent and the effluent reduction benefits;
- the comparison of the cost and level of reduction of such pollutants from the discharge from publically owned treatment works and level of reduction of such pollutants from a class or category of industrial sources;
- the age of the equipment and the facility involved;
- the process employed;
- the engineering aspects of the application of various types of control techniques;
- process changes; and
- non-water quality environmental impacts, including energy requirements.

BPJ limitations for BAT (for total iron and aluminum) are to be determined by considering all of the above factors except the first two. In addition for BAT, the permit writer must consider the cost of achieving such effluent reduction.

For the BPJ limitations established in the 1995 draft permit, EPA reviewed data for water treatment plant facilities which are similar to the Aqueduct. During this analysis, 143 permits for water treatment facilities in the Commonwealth of Pennsylvania, 117 permits for water treatment facilities in the Commonwealth of Virginia, 17 permits for water treatment facilities in the State of Maryland, and 128 permits for facilities in the State of West Virginia were reviewed. EPA concluded that permits for these facilities contained effluent limits similar, if not more stringent than those developed for the draft Washington Aqueduct permit. However, this analysis did not address whether or not the facilities reviewed were of a similar size or employed similar treatment processes. Accordingly, in the 1995 draft permit, EPA established effluent limits of 30 mg/l suspended solids, 4 mg/l total iron and 4 mg/l total aluminum as monthly averages. For the 1995 review, EPA did not look beyond the boundaries of Region III where there are a number of large water treatment facilities located on the Missouri and Mississippi Rivers which do not have effluent limits on these pollutants.

C. Public Reaction to the 1995 Proposed Permit

Reaction to these proposed limits was strong. The Corps and Customers were concerned that the proposed permit would require the Aqueduct to construct and operate an expensive residual solids recovery facility that was beyond their ability to finance. They also believed that the need for the solids recovery facility had not been demonstrated based upon the water quality study performed by the Dynamac Corporation. These concerns were brought to the attention of the U.S. Congress and a letter ensued requesting EPA to delay issuance of the permit, pending resolution of the Customer's concerns. Congressional concern was also evidenced by an amendment to the Safe Drinking Water Act that requires EPA to consult with the Customers prior to issuing the NPDES permit.

The Maryland Department of the Environment wrote in support of the discharge limitations written in the 1995 draft permit, in particular because it was engaged in a similar permitting discussion with Washington Suburban Sanitary Commission (WSSC).

Citizen groups, including The Western Avenue Citizen's Group and the Coalition for Responsible Urban Disposal at Dalecarlia (CRUDD) were concerned that the limits in the proposed permit would require increased truck traffic through their neighborhoods. In addition to the additional vehicular traffic, citizen groups were also concerned about the potential for noise, lack of citizen input and degradation of air quality. Also at that time, the NPS was unwilling to allow this traffic on park roads.

On the other hand, a citizen group identified as the Advisory Neighborhood Commission (ANC) and various commercial and recreational users of the river supported the permit limits because they believed the sediment releases are unaesthetic and detrimental to the health of the river.

9. Facility Description:

The U.S. Army Corps of Engineers owns and operates the Dalecarlia and McMillan Water Treatment Plants which supply potable water to approximately one million residents in the District of Columbia, Arlington County, the City of Falls Church, and portions of Fairfax County and Maryland.

The water supply is provided via the sale, at cost, and delivery to the wholesale customers, e.g., the District of Columbia, Arlington County and the City of Falls Church, Virginia. The customers approve the capital construction budget and are responsible to deposit with the Washington Aqueduct sufficient funds to cover their proportional share of the total costs for running and/or funding improvements to the Aqueduct.

The Washington Aqueduct Division Water Supply System was created by an act of Congress in the mid-1800's with the construction of the Great Falls Dam and intake which is located in Maryland and on the Potomac River. In addition to the intake at the Great Falls Dam, there is a second intake at Little Falls, which is also located in Maryland. Water flows by gravity from the Great Falls intake to a forebay adjacent to the Dalecarlia Reservoir. From this forebay, water is pumped into the Dalecarlia Reservoir by a low-lift booster pump station. Water from the Little Falls Pumping Station is also delivered directly to the Dalecarlia Reservoir.

The Dalecarlia Reservoir is a 46-acre earthen basin that serves as a pretreatment reservoir for both water treatment plants. By this it is meant that approximately 51% of the untreated sediments, which are naturally occurring solids in raw water pumped from the Potomac River, are separated from the aqueous portion of the untreated water in the Dalecarlia Reservoir. These untreated sediments are high quality soil which are periodically removed from the reservoir and land applied.

Water from the Dalecarlia Reservoir is delivered by gravity to both the Dalecarlia Water Treatment Plant (Dalecarlia sedimentation basins) and the Georgetown sedimentation basins which are also locally known as the Georgetown Reservoir. Water from the Georgetown sedimentation basins is delivered to the McMillan Water Treatment Plant. Regardless of which plant processes the water, it is treated in a three-step process which includes sedimentation, filtration and disinfection. The average production is 180 million gallons per day, however, the summertime peak may approach 265 million gallons per day.

Water delivered to the sedimentation basins at Dalecarlia and the Georgetown sedimentation basins contains solids which did not physically settle out at the Dalecarlia Reservoir. These solids must be chemically treated to make the water drinkable. The Dalecarlia Treatment plant includes four sedimentation basins and at Georgetown, there are three larger sedimentation basins. (The Georgetown Reservoir is actually a term-of art for the sedimentation basins at Georgetown.) Water delivered to the Dalecarlia Plant is processed at that location whereas the water delivered to the Georgetown sedimentation basins is routed to the McMillan Plant for further treatment.

The Washington Aqueduct Drinking Water Treatment Plant employs the following

treatment technologies:

Flocculation/Sedimentation - Flocculation refers to water treatment processes that combine small particles into larger particles, which settle out of the water as sediment. Aluminum sulfate (alum) and iron salts or synthetic organic polymers are generally used to promote coagulation. Alum added to water with carbonate alkalinity creates aluminum hydroxide in the form of a visible floc which settles to the bottom of the basin. Nutrients, silt and organic matter sorb to the aluminum hydroxide and hydrogen ions are produced. This process tends to lower the pH of the water, however, if the pH remains in the range of 6 - 8, the nontoxic forms of aluminum will remain. Settling or sedimentation is simply a gravity process that removes flocculated particles from the water.

As described above, primary sedimentation takes place in the Dalecarlia Reservoir, from which the water flows to either the sedimentation basins at the Dalecarlia plant or the Georgetown Reservoir (i.e., sedimentation basins). Complete solids removal is chemically accomplished in the sedimentation basins at these two locations by the addition of aluminum sulfate, a commonly used coagulant, also known as alum. The water is treated with alum after it leaves the Dalecarlia Reservoir, thus, the coagulant and water is mixed by the time the water arrives at the sedimentation basins.

The Dalecarlia Water Treatment plant maintains four sedimentation basins. Basins 1 and 2 are rectangular basins each rated with a capacity of 75 mgd. Basins 3 and 4 are double-deck basins each with a rated capacity of 90 mgd. The average flow of each basin is 196 million gallons per year. Periodically these basins must be cleaned and the frequency of this depends upon the amount of time a basin has been in service (e.g., amount of time lapsed since its last cleaning) and its size. In order to clean the basins, the water is decanted through Outfall 002 followed by the treated sediments which are manually removed from the basins. In a normal year, each Dalecarlia basin is emptied of treated sediments four times per year.

The Georgetown sedimentation basins are divided into two basins (basins 1 and 2), and basin 2 is split into two compartments. The sedimentation basins at Georgetown are larger than those at Dalecarlia, hence they require emptying and cleaning less frequently. The average flow from Georgetown Basin 2 is 220 million gallons per year and the average flow from Georgetown Basin 1 is 60 million gallons per year. Similarly to Dalecarlia basin cleaning, water is decanted first, followed by the treated sediments to the Potomac River via Outfall 003 or Outfall 004. Outfall 003 discharges from basins 1 and 2 while outfall 004 is the discharge point for basin #1. In a normal year, sediments from Georgetown Basin 2 are removed twice per year and sediments from Basin 1 are removed three times per year.

Filtration - Many water treatment facilities use filtration to remove remaining particles from the water supply. These particles include clay, and silts, natural organic matter, precipitants from other treatment processes in the facility, iron and manganese and microorganisms. Filtration clarifies the water and enhances the effectiveness of disinfection.

Dalecarlia employs two filter banks identified as East and West. The East bank filters were constructed during the 1920s and the newer West filter bank was constructed during the 1960s.

Water is fed from the settled water conduit to each filter bank. Filter effluent is collected in the filter underdrain system and lower gullet. The effluent is discharged into the filter effluent conduit and piping system.

Washwater is supplied through a 30-inch diameter header to all filters. Individual 30-inch diameter branches serve each filter. Surface wash is supplied to each filter via rotary surface washers. All waste water is collected in the filter launders and discharged to the upper gullet of each filter. The waste wash water is then discharged to a common conduit that discharges to a recovery basin and is then pumped, untreated, to the Dalecarlia reservoir.

McMillan employs a 12 dual-media filter system. These filters were constructed during the 1980s. Water is fed to the filters from the McMillan Reservoir via a pump station. Wash water is supplied through a 30-inch diameter header to all filters. All waste wash water is collected in the filter launders and discharged to the upper gullet of each filter. The waste washwater is then discharged to a common conduit that flows by gravity to a recovery basin within the McMillan Reservoir.

Disinfection - Drinking water is often disinfected before it enters the distribution system to ensure that dangerous microbes are killed. Chlorine, chloramines or chlorine dioxide most often are used because they are very effective disinfectants, and residual concentrations can be maintained to guard against biological contamination in the water distribution system. Ozone is a powerful disinfectant, but it is not effective in controlling biological contaminants in the distribution pipes. Ozone is not used at the present time, however, the permittee is evaluating its potential use in the future.

Filtered water at the Aqueduct is treated with chlorine, lime and fluoride prior to discharge to the two clearwells. One clearwell has the capacity of 30 million gallons and the smaller a capacity of 15 million gallons. From the clearwells, finished water is pumped to four service areas.

10. Permitted Outfalls

In the District of Columbia, the Washington Aqueduct discharges to the Potomac River and Rock Creek. The Potomac River is classified for secondary contact recreation and aesthetic enjoyment, protection and propagation of fish, shellfish and wildlife, protection of human health related to consumption of fish and shellfish, and navigation as current uses based on the District of Columbia's Water Quality Standards. Rock Creek is classified for all these uses except for navigation.

This permit establishes effluent conditions for outfalls 002, 003, 004, 006 and 007 in

accordance with the following:

A. Outfall 002 - Outfall 002 is the primary outfall for process water and the aluminum (alum) treated sediments from Dalecarlia sedimentation basins 1, 2, 3, and 4. The average flow of these discharges from outfall 002 is 195 million gallons per year. In addition, Outfall 002 is the discharge point for leakage from the sedimentation basins and/or a spring located beneath the Dalecarlia basins which discharges through a pipe into this outfall. The average flow of these discharges is 0.11 million gallons per year. The Potomac River serves as the receiving water for the effluent from outfall 002.

As reported in the updated October 22, 2001, NPDES application for permit reissuance the following describes the effluent characteristics for Outfalls 002, 003 and 004:

PARAMETER	MAX. DAILY DISCHARGE		AV. DAILY DISCHARGE	
	Concentration	Units	Concentration	Units
pH	6.5/8.0			
Flow	475	MGY		
Temperature (winter)	N/A	° F		° F
Temperature (summer)	N/A	° F		° F
Total Suspended Solids (sum of masses from outfalls 002, 003 and 004)	30,400	mg/l	9,500	mg/l
Bromide, oil and grease, radionuclides, sulfide, surfactants, boron, tin, titanium, antimony, beryllium, thallium, cyanide, total phenol, dioxins, all organics and total residual chlorine believed absent.				
Color, fecal coliform, nitrate, total organic nitrogen, total phosphorus, sulfate, aluminum, barium, cobalt, total iron, magnesium, molybdenum, manganese, arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver and zinc believed present.				

B. Outfall 003 - Outfall 003 is the principle outfall for the process water and aluminum treated sediments from Georgetown sedimentation basin 2. The average flow from outfall 003 is 220 million gallons per year. The Potomac River is the receiving stream for this outfall.

C. Outfall 004 - Outfall 004 is the outfall for process water and aluminum treated sediments from Georgetown sedimentation basin 1. The average flow from Georgetown basin 1

through outfall 004 is 60 million gallons per year. The Potomac River is the receiving stream for this outfall.

D. Outfall 006 - Outfall 006 is the outfall for discharges from the City Tunnel. These discharges are comprised of treated river water blowoff which is discharged one time per year for the purpose of inspecting the City Tunnel. The average annual flow is one million gallons per year. The Potomac River is the receiving stream for this outfall.

As reported in the updated October 22, 2001 NPDES application for permit reissuance the following describes the effluent characteristics for Outfall 006:

PARAMETER	MAX. DAILY DISCHARGE		AV. DAILY DISCHARGE	
	Concentration	Units	Concentration	Units
pH	N/A			
Flow	1	MGY		
Temperature (winter)	N/A	° F		° F
Temperature (summer)	N/A	° F		° F
Total Suspended Solids	N/A	N/A		
Bromide, chlorine, oil and grease, radionuclides, sulfide, sulfite, surfactants, boron, tin, titanium, antimony, beryllium, selenium, silver, thallium, cyanide, total phenol, dioxins and all organics are believed absent.				
Color, fecal coliform, fluoride, nitrate, total organic nitrogen, total phosphorus, sulfate, aluminum, barium, cobalt, total iron, magnesium, molybdenum, manganese, arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc are believed present.				

E. Outfall 007 - Outfall 007 is the outfall for discharges from the Georgetown Conduit. These discharges are comprised of treated river water blowoff which is discharged one time per year for the purpose of draining to inspect the Georgetown Conduit. The annual average flow is 0.08 million gallons per year. Rock Creek is the receiving stream for this outfall.

As reported in the updated October 22, 2001, NPDES application for permit reissuance the following describes the effluent characteristics for Outfall 007:

PARAMETER	MAX. DAILY DISCHARGE		AV. DAILY DISCHARGE	
	Concentration	Units	Concentration	Units
pH	N/A			
Flow	0.08	MGY		
Temperature (winter)	N/A	° F		° F
Temperature (summer)	N/A	° F		° F
Total Suspended Solids	N/A	N/A		
Bromide, chlorine, oil and grease, radionuclides, sulfate, sulfide, surfactants, boron, tin, titanium, antimony, beryllium, thallium, cyanide, total phenol, dioxins and all organics are believed absent.				
Color, fecal coliform, fluoride, nitrate, total organic nitrogen, total phosphorus, aluminum, barium, cobalt, total iron, magnesium, molybdenum, manganese, arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver and zinc are believed present.				

11. Proposed Effluent Limits

A. For Outfall 002:

pH requirements are retained from the previous permit and are based upon District of Columbia water quality standards.

Monitoring requirements without limitations are retained from the previous permit for flow, total suspended solids, total aluminum and total iron. Discharge from Outfall 002 is prohibited between February 15 and June 15 of each calendar year except for emergency maintenance. The provision to allow emergency maintenance is necessary to assure a reliable supply of drinking water in the event of an unforeseen equipment failure. During the rest of the year, discharges may occur at Potomac River flows equal to 800 mgd or higher.

For total suspended solids, the *Water Qualities Studies* show that there may be a potential for smothering eggs and juvenile fish if they are in the vicinity of the discharge when it occurs. For this reason this permit prohibits discharges during the Spring Spawning Season when young and juvenile fish are most likely to be present in the river.

Aluminum and iron discharges from Outfall 002 are unchanged from the existing permit, however, redesign of the Georgetown sedimentation basins will reduce the overall amount of these discharges to the river.

With regard to iron, the results of the *Water Quality Studies* showed that the whole effluent is not acutely toxic to the aquatic species tested, however, the chronic toxicity results were not as straight forward. As a result, EPA then referred to the District of Columbia Water Quality Standards (WQS). The WQS do not have an acute criteria, for dissolved iron, however, it does have a chronic criteria of 1.0 mg/l. As specified in the WQS, chronic criteria is defined as the highest concentration of a pollutant to which aquatic life can be exposed for an extended period of time (four day average) without deleterious effects at a frequency that should not exceed more than once every three years. Given the fact that the Washington Aqueduct discharges occur over a short period of time (approximately 4 - 8 hours) it is EPA's opinion that the chronic criteria do not apply in this matter.

For aluminum, as there are no final technology-based standards for the drinking water treatment plant category, EPA looked to the District of Columbia Water Quality Standards for a water quality based limit. Similarly to many states, the District has not promulgated standards for aluminum. EPA considered applying the EPA promulgated national aluminum criteria, however, as those criteria are intended to be applied to waters with a low pH and low mineral content, it is EPA's opinion that it cannot be applied in these waters.

The permit requires monitoring of the Dalecarlia effluent for chlorine. This is necessary is because the cleaning water used to flush the Dalecarlia sedimentation basins is finished water which contains chlorine. Preliminary tests performed by the permittee show that the chlorine is either bound to the sediments or volatilized prior to discharge, however, to assure that no chlorine is released, the permit contains a condition that requires sampling of the effluent at the Hydrostation on the Clara Barton Parkway. If these tests show that chlorine is present, the permittee shall dechlorinate the effluent prior to discharge.

EPA is retaining the narrative DC WQS based requirement that there shall be no discharge of floating solids or visible foam in other than trace amounts.

B. For Outfalls 003 and 004

pH requirements are retained from the previous permit and are based upon District of Columbia water quality standards.

Monitoring requirements without limitations are retained from the previous permit for flow, total suspended solids, total aluminum and total iron. Except for emergency maintenance, discharges from Outfalls 003 and 004 are prohibited between February 15 and June 15 of each calendar year. During the rest of the year, discharges may occur at Potomac River flows equal to 1,500 mgd or higher.

For total suspended solids, the *Water Qualities Studies* show that there may be a potential for smothering eggs and juvenile fish if they are in the vicinity of the discharge when it occurs. For this reason this permit prohibits discharges during the Spring Spawning Season when young

and juvenile fish are most likely to be present in the river. In addition, permittee shall prepare a report of engineering options which may be employed to reduce the amount of sediments released. Sediments must be reduced from the present 51% removed to no less than 80% removed to meet BCT.

In order to protect living resources, the amount of time to accomplish the discharge of the liquid fraction of the effluent shall be increased from 12 hours to 15 hours. In addition, the flushing of the solid portion shall be increased from 4 hours to 8 hours and the amount of raw water used as a diluent shall be doubled.

Aluminum and iron discharges from Outfalls 003 and 004 are for the present time unchanged from the existing permit, however, once implemented, one or more of the identified engineered options of the Georgetown sedimentation basins will reduce the amount of these discharges to the river.

With regard to iron, the results of the *Water Quality Studies* showed that the whole effluent is not acutely toxic to the aquatic species tested, however, the chronic toxicity results were not as straight forward. As a result, EPA then referred to the District of Columbia Water Quality Standards (WQS). The WQS do not have an acute criteria, for dissolved iron, however, it does have a chronic criteria of 1.0 mg/l. As specified in the WQS, chronic criteria is defined as the highest concentration of a pollutant to which aquatic life can be exposed for an extended period of time (four day average) without deleterious effects at a frequency that should not exceed more than once every three years. Given the fact that the Washington Aqueduct discharges occur over a short period of time (approximately 4 - 8 hours) it is EPA's opinion that the chronic criteria do not apply in this matter.

For aluminum, as there are no final technology-based standards for the drinking water treatment plant category, EPA looked to the District of Columbia Water Quality Standards for a water quality based limit. Similarly to many states, the District has not promulgated standards for aluminum. EPA considered applying the EPA promulgated national aluminum criteria, however, as those criteria are intended to be applied to waters with a low pH and low mineral content, it is EPA's opinion that it cannot be applied in these waters. This is also true for discharges from Outfall 002.

Raw water is used at Georgetown to flush the basins during cleaning. This raw water does not contain chlorine, thus, the permit does not require the permittee to test the Georgetown effluent for chlorine.

EPA is retaining the narrative DC WQS based requirement that there shall be no discharge of floating solids or visible foam in other than trace amounts.

C. Discharge of effluent consisting of leakage from basin joints and/or discharge from a spring beneath the Dalecarlia sedimentations through a pipe which is joined to outfall 002.

In February of 1998, EPA issued an NPDES permit, identified as DC0000329, to the Corps of Engineers which covered this discharge. The purpose of this present action is to incorporate all the terms of permit DC0000329 into NPDES permit DC0000019. Thus, all of the applicable conditions in NPDES permit DC0000329 are carried and unchanged in this draft permit. The retained conditions are based on a Best Professional Judgement determination of the treatment requirements of the best available technology economically achievable (BAT) and the best conventional pollutant control technology (BCT). Implementation and achievement of these limits will meet water criteria for these parameters and protect the designated uses of the Potomac River.

D. Outfall 001 which was permitted in NPDES permit DC0000329, and discharged leakage and/or discharge from a spring beneath the Dalecarlia sedimentation basins to the C and O Canal, has been severed and blocked. As this outfall is no longer in existence, it is not included in this draft permit.

E. Outfall 005 which was permitted for the discharge of filter backwash in the 1989 NPDES permit is not included in this draft permit because outfall 005 is located in Maryland and has been permitted by the Maryland Department of the Environment in Maryland permit 00-HT-9503.

F. Permit requirements for outfalls 006 and 007 which include flow, total suspended solids, total aluminum, iron and total residual chlorine were carried over from NPDES permit DC0000329 and remain unchanged. These requirements are based on the best available technology economically achievable (BAT) and the best conventional pollutant control technology (BCT). Implementation and achievement of these limits will meet water criteria for these parameters and protect the designated uses of the Potomac (for outfall 006) and Rock Creek (for outfall 007).

12. Standard Conditions for NPDES Permits

Standard conditions are requirements that must be incorporated into every permit, in accordance with 40 CFR Sections 122.41 and 122.42. These requirements delineate the legal, administrative and procedural requirements of the permit.

The portion of the permit which specify penalties for violations of permit conditions have been updated to reflect higher penalties due to changes in the CWA penalty provisions.

A new condition has been imposed which requires the permittee to submit Discharge Monitoring Reports to the U.S. Fish and Wildlife Service and to the National Marine Fisheries Services. The purpose of this requirement is to provide information to those services regarding discharges which may effect threatened or endangered species or the habitat of threatened or endangered species.

The requirement to prepare a Best Management Plan has been carried over from NPDES permit DC0000329. This requirement was not previously contained in the 1989 issued permit DC0000019.

13. Special Conditions

B. Additional Special Conditions

In addition to the imposition of the above options, the permittee will be required to perform the following:

1. As discussed above, the permittee shall increase the times for discharge and the amount of water used for flushing solids from Outfalls 003 and 004.
2. A provision to allow emergency repair of the Georgetown and Dalecarlia Sedimentation basins has been added should such repair be necessary during the spawning season..
3. The permittee shall perform an engineering study identified as the Preferred Analysis Plan (PAP) to show how it can reduce the amount of sediment discharged from the current 51% to no less than 80%.
4. Three months from the effective date of the permit, the permittee shall submit a report which identifies shareholders and other participants who will assist in the preparation of the PAP, identify the engineering options to be evaluated, their costs and schedules for implementation.
6. The PAP shall be submitted to EPA no later than two years after the effective date of the permit. The plan shall consist of the engineered options considered to achieve 85% removal, preliminary cost estimates, implementation schedules and a preferred option.
7. If the National Environmental Policy Act (NEPA) is triggered by the PAP, the permittee shall use its best efforts to complete construction of the preferred option by the date five years after the effective date of this permit.
8. The engineering study shall show a design or redesign of existing outfalls on public land to reduce their visual profiles and improve the aesthetics at each of the outfall locations.
9. Permittee shall perform a gill net study, using NMFS protocols to determine if shortnose sturgeon exist or overwinter in the vicinity of the Aqueduct's outfalls.
10. Permittee shall submit to EPA a plan showing how it handles off-site removal of sediments.

11. In accordance with the fisheries panel report, the permittee shall apply to the National Park Service for a permit allowing it to remove the rocks from the vicinity of Outfall 002 to ensure an unobstructed flow from that outfall to the Potomac.

14. Public Notice Publication Date, *Washington Post* and *Washington Times*: March 28, 2002.

15. District of Columbia Certification Request letter Date: March 27, 2002.

16. State of Maryland Comment Request letter Date: March 27, 2002

17. Commonwealth of Virginia Comment Request letter Date: March 27, 2002.