FALLING FAR BEHIND:
REPORT ON THE NEW YORK CITY DEPARTMENT OF ENVIRONMENTAL PROTECTION'S PROGRAM TO UPGRADE WASTE WATER TREATMENT PLANTS WITHIN THE NEW YORK CITY WATERSHED

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EXECUTIVE SUMMARY

The 1997 New York City Watershed Memorandum of Agreement (MOA) established a number of programs to protect the drinking water for 9 million New Yorkers. Among these were programs to create or improve sewage treatment infrastructure to prevent or limit human wastes and other contaminants from entering the drinking water. This Report examines the largest sewage infrastructure program -- the one requiring the upgrade of the 102 waste water treatment plants ("WWTPs") that discharge into streams of the New York City Watershed (known as the "Upgrade Program") by May 1, 2002.

When implemented, the Upgrade Program will have significant public health benefits. Upgraded plants will remove 99.9% of disease-causing pathogens from their discharges. This is a particularly important benefit with respect to two microbes that are resistant to chlorination, *Giardia* cysts and *Cryptosporidium* oocysts. Upgraded treatment plants will also remove much of the phosphorus from the waste water. Phosphorus pollution causes annual algae blooms in a number of Watershed reservoirs. This sets off a chain-reaction that injures water taste, odor and color, increases iron and manganese contaminants, and sets the stage for the creation of problematic pollutants known as "disinfection by-products." Moreover, heightened technology and back-up systems installed as part of the Upgrade Program will greatly reduce WWTP failure, and thus the potential for the accidental release of untreated sewage into Watershed streams.

The New York City Department of Environmental Protection's ("DEP") implementation of the Upgrade Program is grossly behind schedule. It is well over three years past the date that the MOA was executed on January 21, 1997, with slightly more than two years remaining until the compliance deadline. As of April 7, 2000, only 50% of the WWTP Upgrades had completed step #4 of the 30 major "steps" involved in DEP's extensive process to Upgrade each WWTP. Only a few plants had progressed further. Importantly, these initial steps, which involve the development of an engineer's proposal and a "conceptual" Upgrade plan, are simple and easy when compared to the difficult and time intensive work of specific design and construction yet to come. Should present trends continue, the completion of the Upgrades could be over two years late.

Serious delays in the Upgrade Program will slow other important efforts to install pollution control infrastructure. The MOA established other programs to create new sewage treatment facilities in certain un-sewered areas, and to permanently divert flow from some WWTPs to discharge points outside of the Watershed. These efforts are to a significant degree dependent on information, assessments and cost estimates that were to be developed as part of

the Upgrade Program. Therefore, slow work on the Upgrades will have a multiplier effect on other infrastructure programs.

These pending delays, if left unaddressed, would represent a major failure by New York City to fulfill its obligations under the MOA. As stated by the National Research Council after undertaking a detailed study of Watershed protection efforts, "[s]uccessful implementation of the MOA is the most important challenge facing the City's water supply managers."[1] When specifically reviewing the Upgrade Program, the Council concluded: "[m]aximum effort should be made to have the upgrades mandated by the MOA installed as quickly as possible at all existing facilities."[2]

DEP must immediately undertake a number of efforts to get the Upgrade Program back on track to meet the May 1, 2002 deadline. Significant additional engineering staff should be retained and dedicated to Upgrade efforts. The excessively long and somewhat redundant process to implement the Upgrade Program should simplified. An additional staff of DEP "expediters" is needed to monitor and marshal each WWTP Upgrade through to completion. DEP executive staff, or some other appropriate individuals, must be given the authority to make critical fiscal and policy decisions, and resolve sometimes costly disputes, with dispatch. DEP must achieve a resolution with WWTP owners concerning those Upgrade costs that DEP will fund and those WWTP repair or improvement costs DEP will not fund. The New York City government overall must view the Upgrade Program as a priority. Finally, DEP must now identify and address looming bottlenecks, such as other governmental permits, the construction contractor shortage, and Upgrade equipment manufacture.

This Report is intended as an alarm bell to alert New York City and other responsible parties of the serious need to fix the Upgrade Program to better protect the public health and avoid the construction of a multi-billion dollar filtration plant.

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[1] National Research Council, Watershed Management For Potable Water Supply: Assessing New York City's Approach, at viii (1999 Prepublication Copy) ("NRC Watershed Report"). This peer-reviewed book was prepared by a working group of the National Research Council whose members were selected for their special expertise and drawn from the National Academy of Sciences, the National Academy of Engineering and the Institute of Medicine. The report exhaustively reviewed the New York City Watershed program and the applicable scientific literature.

[2] Id. at 375.

I. OVERVIEW OF THE WWTP UPGRADE PROGRAM

A. Required Regulatory Improvements

Various provisions of the MOA, the New York City Watershed Regulations,[3] and the New York City Filtration Avoidance Determination ("FAD"), which was issued by the U.S. Environmental Protection Agency ("EPA") in April of 1997, require significant improvements to all WWTPs discharging into surface waters of the New York City Watershed.[4] These required improvements, generally referred to as the "Upgrade Program,"[5] are in addition to those pollution controls required by the New York State Department of Environmental Conservation ("State DEC") pursuant to the Clean Water Act "State Pollutant Discharge Elimination System" ("SPDES") permit program.[6] The MOA did, however, obligate the State DEC to revise all SPDES permits for surface discharging WWTPs to incorporate the Upgrade requirements.[7]

The City's Watershed Regulations and the MOA define the basic attributes of the Upgrade Program's heightened pollution controls. These improvements include: (i) phosphorus removal; (ii) sand filtration; (iii) disinfection; (iv) microfiltration or an equivalent technology;[8] (v) standby power; (vi) power alarm; (vii) automatic start-up capability; (viii) disinfection back-

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[3] 15 RCNY Chapter 18 ("Rules and Regulations for the Protection from Contamination, Degradation and Pollution of the New York City Water Supply and its Sources").

[4] The EPA FAD is the mechanism through which EPA has granted the City of New York permission to avoid the construction of a multi-billion dollar water filtration plant based on the City's continued compliance with water quality criteria and the implementation of extensive efforts to reduce threats to drinking water quality. The FAD applies to that portion of the New York City Watershed which includes the Catskill and Delaware Systems. These two systems have been defined as including all of the Watershed to the west of the Hudson River, as well as the drainage basins of three Watershed reservoirs (Boyds Corner, Kensico, and West Branch) located to the East of the Hudson River, whose waters are generally substantially intermingled with West of Hudson waters. The Catskill and Delaware systems provide, on average, 90% of the water supply.

[5] This Report and the Upgrade Program address only those WWTPs that discharge directly into the surface water streams of the Watershed, and do not include WWTPs that discharge waste water into the ground in a manner similar to that of a household septic system.

[6] See generally ECL §§ 17-0801 et seq.; 6 NYCRR Parts 750 to 758.

[7] MOA ¶ 163(a); see also EPA FAD at 61 (Task #312f-4).

[8] An alternative "equivalent" technology to microfiltration, known as "continuous backwash upflow dual sand filtration," has been approved by EPA and State DOH.

up; (ix) disinfection back-up automatic start-up capability; (x) back-up sand filtration; (xi) recording flow meters; and (xii) alarm telemetering.[9] These improvements are generally referred to as "Best Available Control Technology" ("BACT") or "tertiary" treatment.[10]

After completion of the Upgrades, all WWTP's must "be capable of achieving 99.9 percent removal and/or inactivation of *Giardia lamblia* cysts and 99.99 percent removal and/or inactivation of enteric viruses.[11] Moreover, all WWTPs with waste water discharges of 50,000 gallons per day or less will have a phosphorus limit of 1.0 milligram per liter (mg/L)[12] after Upgrade; WWTPs with effluent discharges between 50,000 and 500,000 gallons per day will be limited to 0.5 mg/L; and those larger plants discharging more than 500,000 gallons daily must not exceed 0.2 mg/L.[13]

B. Public Health Benefits of the Upgrade Program

The Upgrade Program will significantly improve the capacities of WWTPs to remove pathogens that can cause waterborne disease outbreaks, as well as other contaminants.[14] Human waste water is a prime source of human pathogens such as bacteria, human enteric viruses, *Giardia lamblia* and *Cryptosporidium* -- as human pathogens are concentrated in human wastes.[15] *Giardia lamblia* and *Cryptosporidium* are of a heightened concern when found in drinking water because these protozoa form cysts and oocysts that are highly resistant to the

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[9] MOA ¶ 141(c); see also 15 RCNY §§ 18-36(a)(7) and (8), 18-36(f)(5)(v) to (vi).

[10] NRC Watershed Report at 359. The Upgrade Program is substantially more stringent than current State DEC requirements. See Clean Water Act § 301(b)(1)(B) and 304(d)(1), 33 U.S.C. §§ 1311(b)(1)(B) and 1314(d)(1); 40 CFR § 133.102 (describing the requirements of what is known as "secondary" treatment). See, e.g., NRC Watershed Report at 132 to 133 (schematic examples of secondary versus tertiary [or upgraded] WWTP treatment technologies).

[11] 15 RCNY § 18-36(a)(7).

[12] One milligram per liter is roughly equivalent to one part per million.

[13] 15 RCNY § 18-36(a)(8).

[14] As stated by the National Research Council: "The upgrades to WWTPs mandated by the MOA should be effective in reducing effluent concentrations of phosphorus, [total suspended solids], coliforms, viruses, *Giardia* cysts and *Cryptosporidium* oocysts. The requirement that these upgrades use BACT is an important component of New York City's watershed management strategy." NRC Watershed Report at 374; see EPA FAD at 16 to 17, and 25. The importance of limiting these pathogens has been emphasized by EPA. See, e.g., 63 Fed. Reg. 69477 (Dec. 16, 1998)(Interim Enhanced Surface Water Treatment Rule).

[15] NRC Watershed Report at 119 to 120.

chlorine-based disinfection presently employed by DEP when treating raw drinking water.[16] The WWTP Upgrades will be highly effective in removing *Cryptosporidium* oocysts as well as *Giardia*.[17]

The Upgrades will also significantly reduce the discharge of the problematic nutrient phosphorus into Watershed Reservoirs. Phosphorus is the "limiting" nutrient in the Watershed reservoirs, that is, the nutrient that governs the levels of algal growth during most of the year.[18] All of the Watershed reservoirs have been designated as "threatened," "stressed," or even "impaired" because of phosphorus, according to State DEC's most recent impaired water body list prepared in accordance with Section 303(d) of the Clean Water Act.[19]

Excess phosphorus causes growing-season algae blooms in a number of Watershed reservoirs that, in turn, result in poor water taste, odor and color. Phosphorus-induced algae blooms also significantly reduce dissolved oxygen in the bottom waters (due to bacteria ingesting dead algae), cause increased levels of the pollutants iron and manganese (a result caused by a surge in the population of those organisms that thrive in an oxygen-limited environment), and increase levels of organic carbon.[20] The chlorine-based disinfection of waters that are high in organic carbon results in the formation of a class of chemicals known as "disinfection byproducts" -- chemicals that are suspected of having a number of serious adverse health impacts.[21] Therefore, the removal of phosphorus through the Upgrade program is a significant component of efforts to improve and maintain drinking water quality because WWTPs are the primary "point source" of phosphorus in the Watershed.[22]

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[16] NRC Watershed Report at 120.

[17] NRC Watershed Report at 367, 374.

[18] NRC Watershed Report at 5 and 123.

[19] 33 U.S.C. § 1313(d); see New York State 1998 § 303(d) List, published by State DEC Division of Water (April 1, 1998), attachment A, pp. 17 and 18.

[20] NRC Watershed Report at 123.

[21] NRC Watershed Report at 2, 5 to 6, 123. According to EPA, these concerns arise because certain disinfection byproducts have been shown to be carcinogenic in animal studies. Others have caused adverse reproductive or developmental effects in laboratory animals. EPA also cited a study that suggested an association between early term miscarriage and exposure to drinking water with elevated trihalomethane levels. 63 Fed. Reg. 69389, 69394 (Dec. 16, 1998) (Disinfectants and Disinfection Byproducts; Final Rule).

[22] NRC Watershed Report at 10, 123 to 124. Indeed, the form of phosphorus that is released from a WWTP consists largely of soluble reactive phosphorus -- a biologically available form of dissolved phosphorus which plays a strong part in causing reservoir eutrophication. Id.

The Upgrades will also help to reduce the discharge of suspended solids that interfere with the effectiveness of chlorination and are effective in transporting pollutants such as nutrients, metals and pathogens.[23] These improvements will further limit the discharge of materials that increase eutrophication by operating to deplete water of oxygen (known as "biochemical oxygen demanding" materials).[24] Moreover, the operational back-up systems installed with the Upgrades are important in times of floods, power outages, and equipment failures. Without the Upgrades, such failures are more likely to result in the discharge of untreated sewage into drinking water streams. For example, breakdowns at the troubled Yorktown WWTP resulted in four sewage overflows into a Watershed stream in 1999 alone. A number of other plants also suffered avoidable breakdowns in the past few years.

C. Implementation and Costs of the WWTP Upgrade Program

DEP has agreed to pay for all costs of designing, permitting, constructing, and installing the Upgrades required by the New York City Watershed Regulations at all 102 Watershed WWTPs that are in the Upgrade Program.[25] DEP also agreed to pay WWTP owners for the potentially significant increased costs associated with operating and maintaining the Upgrades.[26]

The New York State Environmental Facilities Corporation ("EFC"), a non-regulatory public benefit corporation, has an important role in facilitating key elements of the Upgrade Program. Among other things, EFC was designated to assist DEP as Upgrade "program manager" to facilitate and expedite the Upgrades.[27] The client-agent relationship between DEP and EFC is detailed in MOA Attachment HH ("Agreement Between the New York City Department of Environmental Protection and the New York State Environmental Facilities Corporation to Provide for a WWTP Upgrade Program"). EFC has agreed to "use its best efforts to cause all Regulatory Upgrades to be completed within the time period allowed by the Watershed Regulations" (that is, May 1, 2002) under contracts negotiated by EFC with each

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at 124. Phosphorus flowing from WWTPs is only one component of this problem. It is important to note that large amounts of phosphorus also enter the Watershed reservoirs through polluted runoff, especially in overland storm water flows.

[23] NRC Watershed Report at 15, 126

[24] NRC Watershed Report at 15, 130.

[25] MOA ¶ 141(a) and (c); MOA Attachment HH, Schedule 1 (six DEP-owned WWTPs in the Watershed have already been improved to meet regulatory standards); EPA FAD at 17-18.

[26] MOA ¶ 141(b) and (c).

[27] MOA § 141(d)(i).

WWTP owner.[28] DEP has retained third-party beneficiary enforcement rights in these contracts.[29]

As discussed in detail later, the multi-phased program formulated to implement the Upgrade Program for each WWTP is detailed and complex. Despite EFC's title as program manager, however, DEP has retained continuing authority to review, direct additional work, revise and approve almost every step of the process for each WWTP Upgrade.[30]

D. Diversion of Waste Water Outside of the Watershed

The MOA creates a program to study and potentially implement the permanent diversion of sewage flow from at least some WWTPs located within Putnam and Westchester Counties to a treatment and discharge location outside of the Watershed.[31] Westchester or Putnam County may divert sewage flow using funds provided by New York City under the MOA (known as the "East of Hudson Water Quality Funds").[32] This program provided $38 million to Westchester and $30 million to Putnam (plus a substantial amount of interest that has now accrued) for use on an array of water quality improvement projects.[33]

Should Putnam or Westchester County divert sewage flow and close the WWTP, the Upgrade of that plant, of course, would be unnecessary. Under such circumstances, DEP is obligated to add to the county's East of Hudson Water Quality Fund "an amount equal to the costs of designing, constructing and installing the upgrades for which the City [DEP] is no longer obligated to pay."[34] The estimate of the avoided Upgrade costs are to be determined through negotiations between the county and City DEP based on "the specific circumstances of the WWTP and such costs actually incurred for similar WWTPs."[35]

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[28] MOA ¶ 141(d)(iii); MOA Attachment II ("Model Upgrade Contract Between New York State Environmental Facilities Corporation and a Wastewater Treatment Plant owner").

[29] MOA Attachment II § 1.02.

[30] MOA ¶ 141(d)(ii); MOA Attachment HH; MOA Attachment II.

[31] MOA ¶¶ 139, 140(b)(i), 140(j) and 140(l).

[32] MOA ¶ 140(b)(i).

[33] MOA ¶ 140(f).

[34] MOA ¶ 140(l).

[35] Id.

E. New Sewage Treatment Infrastructure and SPDES Upgrade Programs

The MOA also includes a program to reduce the flow of human wastes and pollutants into the drinking water by providing $75 million in New York City funds to help correct sewage treatment problems in Watershed communities located west of the Hudson River.[36] This "New Infrastructure Program" provides for new WWTPs, community septic systems, or septic districts (along with necessary sewage collection systems) in towns or villages that presently have numerous problematic or failing septic systems in the vicinity of water supply streams. The MOA identifies seven communities with priority rights to monies for new sewage infrastructure (Hunter, Fleischmanns, Windham, Andes, Roxbury, Phoenicia and Prattsville), while fifteen other communities are designated to receive any remaining funds.[37]

Under the MOA's SPDES upgrade program, DEP is providing up to $4.6 million to assist WWTP owners in bringing their WWTPs into compliance with their SPDES permits.[38]

II. INTERIM AND FINAL DEADLINES FOR WWTP UPGRADES

The final date for having all WWTPs complete the required Regulatory Upgrades is May 1, 2002.[39] The FAD and the Watershed Regulations contain a number of other requirements with respect to the Upgrade Program:

* By June 1, 1997, DEP was required to develop a form agreement with WWTP owners to assure the Upgrades necessary to comply with the Watershed Regulations.[40]

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[36] MOA ¶ 122(a).

[37] MOA ¶ 122(b) and (c). The other 15 communities are: Bloomville, Boiceville, Hamden, Delancey, Bovina Center, Ashland, Haines Falls, Trout Creek, Lexington, S. Kortright, Shandaken, West Conesville, Claryville, Halcottsville, and New Kingston.

[38] MOA ¶ 121.

[39] See 15 RCNY § 18-36(a)(10).

[40] EPA FAD at 60 (Task #312f-1). The form agreement is set forth in Attachment II to the MOA. Through additional negotiations with MOA party representatives and later with individual WWTP owners, the form agreement was finalized as the Upgrade Agreement and entered into with each of the WWTP owners ("Upgrade Agreement"). As presented later in this Report, this agreement is a key component of the Upgrade Program because it outlines the multitude of steps, submissions, reviews and requirements involved when implementing each WWTP Upgrade.

* By May 1, 1998, DEP was required to have all WWTP owners enter into and submit agreements, including facility compliance plans and Upgrade schedules, to assure the timely implementation of Upgrades by the May 1, 2002, completion date.[41]

* By November 1, 1998, DEP was required to have approved the WWTP "facility upgrade plans and compliance schedules consistent with the [City] watershed rules and regulations. . . . The schedules must reflect the ability of the [WWTP] owners to complete the required WWTP upgrades in accordance with the deadlines and other requirements of the [City] watershed rules and regulations."[42]

* DEP must undertake "all necessary enforcement actions" to assure the completion of WWTP Upgrades.[43]

III. AGENCY STAFF RESOURCES FOR UPGRADE PROGRAM IMPLEMENTATION

DEP currently has a total of three persons dedicated strictly to Upgrade Program implementation, none of whom is an engineer. Until fairly recently, DEP's Upgrade Program Manager was DEP's sole staff person working full time on implementation. DEP has also assigned engineers, who often have other extensive responsibilities, to work on various Upgrade tasks. A significant amount of DEP legal review is necessary for contracts, insurance policies, contractor bonds, negotiations and the like, all of which are associated with the Upgrades.

EFC, under a contract with DEP, has employed four full-time professional engineers with experience on WWTPs to work on the Upgrade Program. These engineers are supervised by an experienced engineer who spends approximately one-half of his time on the Upgrade Program.

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[41] EPA FAD at 61 and 62 (Tasks #312f-2 and #312n); 15 RCNY § 18-36(a)(10);owner Upgrade Agreement § 2.02(C). By executing an Upgrade Agreement, any given WWTP satisfied the first two requirements prescribed in 15 RCNY § 18-36(a)(10). Having had EFC enter into Upgrade Agreements with all WWTP owners, DEP has met EPA FAD Deliverables 312n and 312n-1.

[42] EPA FAD at 63 (Task #312n-1); 15 RCNY § 18-36(a)(10); Upgrade Agreement § 2.02(C). As noted in footnote 41, this requirement was satisfied by execution of Upgrade Agreements between WWTP owners and EFC. These contracts are considered by EPA and DEP to contain the necessary plan and schedule for completion of the Upgrades. See Upgrade Agreement § 2.02(C).

[43] EPA FAD at 63 (Task #312o); see also Upgrade Agreement § 1.02 (DEP third-party beneficiary enforcement rights as against WWTP owners). Enforcement actions include an action for breach of the Upgrade Agreement and an action for violation of 15 RCNY § 18-36(a)(10).

EFC also has assigned two full-time attorneys to this program, as well as accounting, clerical and administrative staffers who contribute significant time to this effort. EFC's Director of Technical and Advisory Services oversees the work of EFC staff on the Upgrades in addition to other significant responsibilities.

IV. DEP'S PROCESS FOR IMPLEMENTING THE REGULATORY UPGRADES

DEP's process for implementing the Regulatory Upgrades is detailed in the contract between EFC and each Watershed WWTP owner.[44] The key players in this process are DEP, EFC, the WWTP owner, the owner's engineer and the general contractor. The MOA and the Watershed Regulations contemplate an approximately 3 1/2 year time period for the actual performance of the Upgrade work specified in the EFC/WWTP owner contract and assume that Upgrade work will be commenced no later than November 1, 1998.[45]

Attached as Appendix A to each EFC/WWTP owner contract is the "WWTP owner Scope of Work"[46] which describes roughly 30 significant steps necessary to complete a WWTP Upgrade after approval of the EFC/WWTP owner contract. Also attached to each EFC/WWTP owner contract is a "Schedule of Work"[47] which lists time periods for the WWTP owners to complete ten individual "milestones." These milestones encompass only a portion of the work involved in completing the Upgrades and do not account for the significant time necessary for DEP, EFC and other governmental agencies to review and comment. The major steps and milestones are as follows:

1. WWTP owner must solicit, and potential engineers must prepare and submit, proposals from engineers for implementing the WWTP Upgrade. A minimum of two engineering proposals must be received. (Milestone #1, WWTP owner given 2 months to complete).
2. WWTP owner evaluates and submits for EFC's review the two lowest cost and best qualified engineering proposals. Tentatively selected engineer also must provide documents satisfying DEP "Request for Qualifications" form, "Request

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[44] A model contract was attached to the MOA as Attachment II, but each WWTP owner entered into an individual contract with EFC.

[45] See footnotes 39 and 42 along with the associated text of this Report.

[46] This document has been appended to this Report as Exhibit B.

[47] EFC/WWTP Owner contract, Attachment B to Appendix A. This document has been appended to this Report as Exhibit C.

for Proposal" form, and "City Vendor Information Exchange System" ("VENDEX") forms. (Milestone #2, WWTP owner given 2 months to complete). EFC reviews submissions and then forwards complete submission, along with its comments, to DEP for review, revision and ultimate approval.

3. After approval of engineering proposal, WWTP owner prepares, negotiates and submits draft contract between the WWTP owner and the engineer for review, revision and approval by DEP. Contract must be drafted to contain numerous clauses required by DEP. (Milestone #3, WWTP owner given 1 month to complete). After DEP review and written approval, EFC is allowed by DEP to authorize WWTP owner to execute contract with the engineer.

4. After execution of the WWTP owner/engineer contract, a "pre-Conceptual Upgrade Plan" ("CUP") facility visit and meeting between EFC, DEP, the WWTP owner, and the selected engineer must take place.

5. Selected engineer evaluates and proposes various Upgrade project approaches in writing to EFC for review and comment before commencing the CUP; WWTP owner and engineer must develop a schedule of work and submit it to EFC and DEP for review and comment.

6. WWTP owner and engineer submits the "proposed CUP" -- containing design parameters for the WWTP Upgrade, a review of alternative technology, and initial cost estimates. (Milestone #4, WWTP owner given 4 months to complete). EFC and DEP review, and require any revisions to the proposed CUP.

7. WWTP owner and engineer must revise the CUP in accordance with EFC and DEP comments and then submit a final CUP to EFC and DEP for review, revision and ultimate approval.

8. After DEP approval of the CUP, WWTP owner and engineer must submit a proposed WWTP facility plan to EFC for review, the direction of additional work, and comment. (Milestone #5, WWTP owner given 3 months to complete).

9. WWTP owner and engineer must submit the revised WWTP facility plan to EFC and DEP for additional review, revisions and ultimate approval.

10. Upon the approval of DEP and the written authorization of EFC, the WWTP owner and engineer begin to prepare a "Proposed Upgrade Plan" ("PUP"), which includes a detailed facility plan and a detailed Upgrade design (i.e. contract specifications, contract drawings, construction cost estimate, construction schedule, operation plans, operation and maintenance cost estimate, contractor bid documents).
11. WWTP owner and engineer must prepare and submit to EFC a "draft PUP" when the draft PUP is approximately 65% complete; thereafter, EFC schedules and conducts a "Mid-Design Meeting" with the WWTP owner and engineer to evaluate and discuss the 65% draft PUP.

12. WWTP owner and engineer prepare and submit the "100% complete" PUP to EFC for review and comment. (Milestone #6, WWTP owner given 4 months to complete). EFC engineering staff to review PUP for compliance with Watershed Regulations, the "Scope of Work," State DEC WWTP guidance, and applicable regulations. EFC comments and directs additional work by engineer.

13. After WWTP owner incorporates EFC's comments, the PUP is submitted to DEP for detailed engineering review, revision, direction of additional work, and approval.

14. Upon DEP approval and authorization to proceed from EFC, the WWTP owner must forward PUP to all regulatory agencies with jurisdiction over the Upgrade project (e.g. Westchester County Department of Health, State DEC, some local planning boards, etc.) for review and comment. All such comments are compiled by the WWTP owner and forwarded to EFC. EFC reviews the agency's proposed comments and transmits them to DEP with EFC's written recommendations on whether to accept or reject comments.

15. WWTP owner and engineer are to incorporate any required changes into the PUP (that are approved by DEP) and resubmit the revised PUP as a proposed "Final Upgrade Plan" ("FUP") to the regulatory agencies and DEP for further review and revision. (Milestone #7, WWTP owner given 1 month to complete). If approved by DEP, this document is designated as the FUP.

16. Upon approval of the FUP by DEP, the WWTP owner is to draft and negotiate necessary amendments to its contract with the engineer to conform with the FUP, subject to review, revision and approval by EFC and DEP.

17. Upon approval of the FUP by DEP, the WWTP owner and EFC are to negotiate any necessary amendments to their contract, subject to the review, revision and approval of DEP.

18. After approval of the revised contracts, EFC will send the WWTP owner a written "Notice to Proceed With Bid Solicitation." The WWTP owner and engineer must then conduct a pre-bid meeting and site visit with potential construction contractors and answer contractor questions.

19. WWTP owner and engineer must conduct the construction bidding process and submit the two low bids from responsible contractors to DEP for review and approval; WWTP owner must also submit certification and documentation that bid process was undertaken in accordance with DEP's "Bidding Protocol Document."

20. DEP reviews all submissions by the WWTP owner with respect to the construction contract. DEP may require re-bid if cost is deemed too high. When submissions are approved, DEP allows the WWTP owner to issue a "notice of award to the apparent low bidder."

21. WWTP owner and engineer must provide to DEP documentation of all required bonds and insurance for DEP review and approval. Upon DEP's written approval of contractor's bonds, VENDEX submission and insurance submissions, EFC issues a "Notice to Proceed with Execution of Contracts and Construction."

22. WWTP owner negotiates, finalizes and executes the contract with the general contractor (Milestone #8, WWTP owner given 2 months to complete) and submits contract to EFC and DEP for review and approval.

23. Engineer to conduct a "preconstruction meeting with WWTP owner, contractor, EFC and DEP. Engineer to convene "construction progress meetings" with contractor and subcontractors on a monthly basis and submit minutes of these meetings to EFC and DEP.

24. Contractor undertakes installation of WWTP Upgrades. During construction the engineer must submit change orders in writing (with a cost estimate) to EFC and DEP. A change order may not be implemented by the engineer until written approval is received from DEP or EFC.
25. Contractor is to prepare "Contractor Completion Documents" and submit them to engineer for review and transmission to EFC and DEP.
26. WWTP owner and engineer are to develop and submit WWTP "Startup Plan," "Acceptance Procedures" and "Plan of Operation" documents to EFC and DEP for review, revision and approval.

27. DEP and WWTP owner negotiate and enter into an agreement concerning the payment by DEP of the increased operation and maintenance costs associated with the WWTP Upgrade.
28. WWTP owner and engineer must prepare and submit a written certification that the WWTP is "Functionally Complete" and arrange for the "Final Inspection" by the WWTP owner, engineer, EFC and DEP. (Milestone #9, WWTP owner given 9 months to complete). After review, possible revision, further construction, and approval, DEP will issue a "Notice to Proceed to Startup and Performance Testing."
29. Engineer undertakes WWTP Upgrade startup and performance testing to assure compliance with all requirements of NYC Watershed Regulations. DEP reviews, directs additional work, and approves the startup and performance testing.
30. Engineer to submit "close out" documents to EFC including the final Operation and Maintenance Plan, Facility Manual, an estimate of operation and maintenance costs associated with the WWTP Upgrades, and "as built" engineering drawings subject to the review, revision and approval of DEP. (Milestone #10, WWTP owner given 1 month to complete). WWTP Upgrade is now complete.

While this list is not exhaustive, it does include most of the time or work intensive elements of the Upgrade process. An interesting schematic view of this process is presented in Exhibit D to this Report, a drawing prepared by Malcolm Pirnie, Inc., the engineer for a number of the Upgrades. This schematic did not, however, serve as a basis for the 30 steps listed above.

V. CURRENT STATUS OF THE WWTP UPGRADES

The current status of the WWTP Upgrades demonstrates that the program is seriously behind schedule. Although EFC was successful in obtaining most executed Upgrade contracts by June or July of 1998 (allowing work to begin), relatively little progress has been made through the 30 step Upgrade process since that time. At the present rate, few, if any, WWTPs Upgrades will be completed by the May 1, 2002 deadline. In fact, delays of two years beyond the May 1, 2002 compliance date, or even longer, appear very likely if present trends continue. This appears to be the case even if a number of these "steps" are undertaken simultaneously. Attached as Exhibit E to this Report are detailed charts that provide the specific status of each individual WWTP Upgrade based on data from DEP.

As of April 7th of this year:

* 102 of 102 WWTPs had completed step #2 of the 30 step Upgrade process (submission of the engineering proposal to EFC).

* 80 of 102 WWTPs had completed a portion of step #3 of the 30 step Upgrade process (engineering proposal approved by DEP).

* 61 of 102 WWTPs had completed step #3 of the 30 step Upgrade process (EFC authorizes WWTP owner/engineer contract to be signed).

* 52 of 102 WWTPs had completed step #4 of the 30 step Upgrade process (schedule and hold the "pre-CUP" meeting).[48]

* 15 of 102 WWTPs had completed step #6 of the 30 step Upgrade process (submission of the draft CUP to DEP).

* 1 of 102 WWTPs had completed step #7 of the 30 step Upgrade process (approval of the CUP by DEP).

Therefore, as of April 7, 2000, with 25 months remaining until the compliance deadline, only one-half of the WWTPs were in a position to begin developing the initial "conceptual" proposals for undertaking the Upgrades. Only 15 WWTP owners had submitted a draft CUP to DEP and just one CUP had been approved. Importantly, the work remaining -- the detailed engineering design, blueprints, cost estimates, construction bidding, equipment manufacture, construction, "operation and maintenance" cost contract negotiations, and facility start-up testing -- is

[48] There was no data presently available on the status of step #6 (the required submission to EFC of the engineering consultant's evaluation of alternative Upgrade project approaches). Attached as Exhibit F to this Report is EPA and DEP correspondence, and a FAD report from DEP, concerning the status of the Upgrades.

substantial and promises to be more time and work intensive than the initial efforts undertaken thus far.

Delays in completion of the Upgrades are likely because the Upgrades have taken 17 months to generally complete only 4 to 5 steps in a 30 step process.[49] It is appropriate to ask how long it will take DEP to manage the completion of the remaining 25 steps in the Upgrade process.

VI. CONCLUSIONS AND RECOMMENDATIONS

A. Conclusions

Our evaluation of the attributes and status of the Upgrade Program has resulted in the following overall conclusions:

* At the present pace of work, almost none of the 102 WWTPs in the Upgrade Program will meet the May 1, 2002 compliance deadline.

* Delays in completion of WWTP Upgrades could be two years or more if the speed of efforts to complete tasks required by the Upgrade process is not dramatically increased.

* DEP has seriously understaffed the Upgrade program, placing the current staff assigned to the Upgrade Program in an all-but-impossible situation.

* The Upgrade process has too many steps and is frequently unworkable.

B. Adverse Impacts of Upgrade Delay

Delays in DEP's completion of the WWTP Upgrade Program is likely to have a number of adverse ramifications.

Public Health. The Upgrade Program will significantly limit the discharge of disease causing pathogens that are resistant to chlorination (e.g., *Giardia* cysts, *Cryptosporidium* oocysts) and pollutants (e.g., phosphorus, suspended solids). Delay in the implementation of the Upgrade Program delays these benefits. The Upgrade Program will also strongly assist in limiting facility breakdowns that have resulted in the discharge of untreated sewage into drinking water streams. The Upgrade Program, when multiplied by the 102 WWTPs that discharge into drinking water streams, will have enormous benefits for the protection of public health, particularly with respect to pathogen removal. The sooner the Upgrades are implemented, the better.

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[49] Using the most favorable November 1, 1998 date to initiate actual Upgrade efforts. See footnotes 41 and 42 and associated text.

Filtration Avoidance. DEP's effectiveness in implementing the Upgrades in a timely fashion, as specified in the EPA's 1997 Filtration Avoidance Determination and the MOA, will be an important factor in EPA's 2002 determination as to whether to allow New York City to continue to avoid the construction of a $6 to 8 billion filtration plant for the waters of the Catskill and Delaware portions of the Watershed.

Delays In Other Programs. The MOA contains a number of other important programs to install new infrastructure to limit human waste and other pollutants that enter the drinking water. These programs include: (i) the $75 million program to install new sewage treatment infrastructure in a number of Watershed communities to the west of the Hudson River; (ii) the $4.6 million SPDES upgrade program; and (iii) the efforts to permanently divert from the Watershed the sewage flow from certain WWTPs in Westchester and Putnam Counties.[50]

Importantly, a determination on whether to proceed with these other programs is often dependent on financial cost estimates and technical design information that is to be developed as part of the Upgrade Program. For example, the available funds for a proposed new sewage infrastructure project that encompasses an existing WWTP will not be known until completion of the engineering cost estimates from the Upgrade Program. This lack of information prevents the project design from being finalized, causing delay. Similarly, efforts by Westchester or Putnam Counties to divert WWTPs cannot be finalized until each County knows the specific cost estimates for the Upgrade of the WWTP slated for diversion. This is so because the estimated expense to DEP of the Upgrade may instead be used to fund the WWTP diversion by the County. Delays in developing Upgrade cost estimates have delayed Westchester County's proposed diversions of the Yorktown and Riverwoods WWTPs since August of 1999. In addition, SPDES Upgrade work is generally planned to be incorporated into the overall Upgrade of designated facilities. Thus, the SPDES upgrade monies are essentially frozen until the Upgrade work is actually undertaken.

C. Recommendations

The following recommendations should be implemented by DEP in order to avoid serious delays in completing the Upgrade Program:

Dedicated Engineering Staff. DEP should immediately dedicate a substantial number of contract engineers to the Upgrade Program. DEP will require increasing levels of engineering resources to review WWTP designs and blueprints, monitor construction, review contractor change orders, assess cost estimates, and approve and assess WWTP start-up testing. Importantly, the Upgrade effort should not be accomplished at the expense of other vital DEP water protection programs that require the engineering services of existing DEP staff.

[50] These MOA programs are described in Sections I. D. and I. E. of this Report.

DEP Executive Staff Authority. There are a large number of upcoming decisions concerning the Upgrades that will involve significant fiscal negotiations and commitments by New York City. This includes Upgrade decisions affecting new infrastructure, WWTP diversions, SPDES Upgrade expenditures, as well as agreements concerning City payments for ongoing operation and maintenance costs of the Upgrades. Moreover, DEP must reach an understanding with WWTP owners concerning those Upgrade costs that DEP will fund and those WWTP repair or improvement costs that DEP will not fund. As with many governmental agencies, DEP decisions can grind to a halt when approvals concerning expenditures are sought. When multiplied by 102 WWTPs, it is a formula for deadlock. Within the parameters of statutes and New York City fiscal procedures, DEP executive staff or other dedicated mayoral staff should be provided with much broader authority to quickly negotiate and resolve fiscal and policy matters affecting the Upgrade Program.

Process Simplification. The Upgrade Program is complex -- containing a multitude of steps for each of 102 WWTPs. It also appears to contain a number of serious bottlenecks, as well as looming disputes (concerning cost estimates, engineering designs, technology selection, etc.) that will cause delay. Almost every major step in the WWTP Upgrade process involves the WWTP owner or engineer (or both) developing technical submissions for review, revision, direction of additional work, and ultimate approval by DEP. Whenever possible, efforts should be made to complete steps in the Upgrade process simultaneously. Other steps that would normally follow a set sequence (e.g., design, permitting, bidding, contracting, construction and close-out testing) simply must be moved along as quickly as possible. DEP must also reduce, consolidate, and remove as many steps in the 30 step Upgrade Program as possible. Greater discretion should be given to DEP staffers to issue authorizations or approvals without a re-review and re-approval by higher level DEP staff. Whenever possible, work on other aspects of an Upgrade should be allowed to go forward while earlier phases are being reviewed.

Other Governmental Approvals. Non-DEP agencies with regulatory approval authority over the WWTP Upgrades need to be brought into the process at a much earlier stage than is presently planned. An expedited review process should be developed that respects the jurisdiction of other agencies and recognizes the increased workload created by the Upgrade Program. Other governmental permitting entities should recognize the urgency of this program and the fact that DEP's engineers will conduct a detailed review of all actions. Current DEP plans to seek other agency approvals at the very end of the design process have the potential to overwhelm these agencies and cause extensive delays. Close coordination and cooperation will be necessary.

Construction Contractors. The growing economy has resulted in a potential shortage of available contractors to perform the Upgrade work. There is an urgent need for DEP to identify, recruit, train, and pre-approve general construction contractors and major sub-contractors now. Efforts should be made to simplify and clarify the Upgrade process so that a sufficient pool of general contractors and major sub-contractors is available when the construction bids are issued.

Failure to do this now will likely result in serious delays and cost overruns due to fewer and higher bids.

Guidance. DEP and EFC have developed a number of very useful technical and procedural guidance documents on a variety of Upgrade Program matters. Too often, however, this guidance is not developed until after a delay-causing uncertainty arises. DEP and EFC should re-examine the Upgrade process to identify areas where guidance documents will be needed in the future and begin work on developing necessary guidance now.

Document Delays or Inactivity. DEP staff needs to document instances of delays or inactivity by WWTP owners or their engineers in completing WWTP Upgrades. Apparent "bad faith" delays should be investigated. This documentation will assist in future decisions concerning judicial enforcement actions that may be necessary to obtain compliance with WWTP regulatory and contractual requirements.

Expediters. As with the engineering staff, DEP should retain additional staffers to track and expedite the Upgrade process for each WWTP within the DEP organization. EFC already acts as the facilitator and expediter of the Upgrade Program generally. Within each WWTP Upgrade there are numerous DEP reviews, paper transactions, approvals, and policy questions that require attentive facilitation among various DEP bureaus to complete. To achieve compliance by May 2002, DEP should assemble a small staff of expediters focused on the task of coordinating and promptly completing DEP's Upgrade work. DEP's expediters should also maintain documentation of undue delays or inactivity by DEP, WWTP owners or WWTP engineers.

Equipment Manufacture. DEP and EFC need to actively work with the equipment manufacturers concerning the large upcoming need for technical equipment that frequently is not maintained on inventory. These efforts should take place as soon as possible after technology is selected (particularly the dual sands or microfiltration technology, and the phosphorus removal equipment) so that there is not a backlog in the availability of this relatively new or limited technology when construction is ready to move forward.

VII. RESPONSE TO DEP COMMENTS

A draft of this Report was provided to DEP on March 30, 2000, for review and comment.[51] DEP Commissioner Miele provided a useful and frank response by letter dated April 10, 2000. This letter has been incorporated in its entirety as Exhibit A to this Report. DEP's coments have been carefully considered. A number of DEP's comments have been incorporated into the final Report. Our response to DEP's comments follow:

[51] The draft Report contained the status of WWTPs as of March 6, 2000.

Introduction. It is agreed that the deadline for completion of all WWTP Upgrades is May 1, 2002. We welcome all efforts by DEP to quickly take concrete action to implement those efforts that have been recommended in this Report, including specific measures to simplify and streamline the Upgrade process. Putting the issue of assigning fault for delays aside, we stand by our opinion that the Upgrade Program is serioulsy behind schedule, needs a great deal of energetic attention to put it back on schedule, and that DEP is centrally responsible for assuring timely Upgrade implementation through a variety of mechanisms that are at its disposal. We also recognize the vital need for good faith cooperation by WWTP owners and engineers to help assure that this important public health effort is accomplished on time.

A. Overview Comments.

1. We agree that the complex Upgrade process was the result of negotiations by the many parties to the MOA, which included the State. It is important to underscore that the implementation of the Upgrades is further complicated by numerous negotiations over the appropriate scope and costs of the Upgrades (exactly what is required by the Watershed Regulations, what is not required, and who pays). The added layer of complexity results from the unusual situation where DEP is paying for all costs of Upgrade improvements to WWTPs it does not own or control. This makes it all the more necessary for DEP to provide the staff and intense executive level attention that is often necessary to quickly resolve thorny fiscal and technical disputes.

2. While DEP states that it has a team of engineers and others readily available to undertake work on the Upgrade Program, it is our view that the current seriously delayed status of the Upgrade Program demonstrates that the assigned staff has not been sufficient or sufficiently focused on tasks that will assure timely Upgrade implementation. This Upgrade effort will require enormous amounts of work, with DEP as the ultimate decisionmaker. We continue to encourage DEP to obtain more staff resources. The dedicated staffing needs will become especially important as this program enters the more intensive and difficult phases associated with specific Upgrade design, construction, and quality assurance testing. DEP needs to assure fast turn-around on its work. DEP also must maintain detailed staff involvement with the WWTP owners, engineers and contractors to explain, track and expedite their Upgrade work.

B. Comments on Language.

1. SPDES Upgrade Program Description: Comment noted and incorporated.

2. Footnotes pertaining to the FAD and the Watershed Regulations: Comments noted and incorporated.

3. Milestones. We derived the “30 step” process to Upgrade each WWTP from the official model contract between EFC and the WWTP owners, not the Malcolm Pirnie flow chart. The Malcolm Pirnie flow chart (now attached as Exhibit D) is useful as it provides a visual

presentation of one engineering firm's view of the Upgrade process. We have not, however, adopted this chart as all inclusive or absolutely accurate.

We are of the opinion that 3 or 4 steps in the 30 step Upgrade process could be accomplished simultaneously with other work. We fully support DEP's stated goal of undertaking these steps at the same time to save time. However, most steps in the Upgrade process build upon the previous steps -- taking place in a natural sequence. This highlights the need to focus attention on moving each of 102 WWTPs through each of 30 major steps as quickly as possible.

The 30 major steps in the Upgrade process present individual tasks that have a fairly extensive amount of work associated with each of them, be it developing a document, reviewing technical designs, negotiating a contract, or something else. This list, though long, is not exhaustive. These steps have been set forth in a manner that fully recognizes the 10 "milestones" developed by DEP and the associated time periods for work by the WWTP owner. We note that these milestones have not been achieved within their associated timeframes to date. Importantly, moreover, DEP's milestones set forth time frames only for the work of the WWTP owner, engineer or contractor. These milestones do not account for the time necessary for DEP, EFC and other governmental entities to review, inspect and comment upon this work. Therefore, the time consuming comment and response associated with the review and approval of each step of Upgrade implementation essentially is not taken into account by DEP's milestones. Our presentation of the Upgrade process as involving 30 discrete steps is complete and realistic.

4. Current Status of WWTP Upgrades. We have amended the text of the Report to reflect the status of the Upgrades as of April 7, 2000. We do not believe an increment of only one month is sufficient to conclude that "the Program's pace is quickening," although we hope that is true.

C. Response to Recommendations.

DEP generally agrees with the Report's recommendations. We look forward to the specific implementation of these recommendations. We are troubled, however, that some of DEP's responses are vague and lacking in concrete details. While DEP generally references work in progress, we are particularly interested in seeing DEP reach firm agreements or take specific action concerning such matters as additional engineering staff, expediters, other governmental permit reviews and construction contractors.

It also appears that DEP is only just beginning several processes to speed Upgrade implementation. For example, DEP "has commenced the process of hiring engineering firms," "has also reached out to" certain counties regarding their WWTP approval processes, has "already begun internal discussions to identify possible steps to avoid" a construction contractor shortage, and "began investigating" the feasibility of expediting Upgrade equipment purchases.

Given the recognized urgency of this program, we hope DEP will commit to the achievement of these tasks and recommendations within a definite time in the near future.

We note that DEP is of the firm opinion that it will be unable to reduce the number of steps presently specified for the Upgrade process. If this is in fact the case, it will be all the more important to develop guidance, expedite reviews, anticipate future bottlenecks, and pressure each WWTP through each step of the process.

DEP did not directly respond to our strong recommendation concerning empowering executive staff at DEP (or other appropriate mayoral staff) to quickly negotiate and resolve thorny fiscal and policy disputes with other Upgrade parties. Real decision-making authority is vital given the extensive number of disputes and negotiations that loom ahead concerning the Upgrade Program, WWTP diversions and new infrastructure.

We look forward to continuing our dialogue with the DEP on this important matter.