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UNITED STATES GENERAL ACCOUNTING OFFICE
WASHINGTON, D.C. 20548

RESOURCES, COMMUNITY, AND ECONOMIC DEVELOPMENT DIVISION

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B-209867

DECEMBER 1, 1982

The Honorable Anne M. Gorsuch
Administrator, Environmental
Protection Agency

Subject: Savings Possible Through Use of Variable Effluent Limits for Advanced Waste Treatment Projects (GAO/RCED-83-57)

Dear Ms. Gorsuch:

We believe the potential exists for savings through the use of variable effluent limits (VEL's) in the operation and construction of advanced waste treatment facilities. While reliable nationwide savings estimates are not available, a number of Federal and State officials and a State of Georgia study estimates that millions of dollars in operating costs could be saved each year. We believe that the Environmental Protection Agency (EPA) needs to emphasize to its regional offices and delegated States that VEL's, when properly used, can result in cost savings while maintaining water quality.

THE NATURE AND FUNCTION OF VARIABLE EFFLUENT LIMITS

Under the Federal Water Pollution Control Act, as amended, (33 U.S.C. 1251 et seq.) municipal, industrial, and other facilities discharging waste directly into waterways must have a National Pollution Discharge Elimination System (NPDES) permit. NPDES permits, issued for a maximum of 5 years, establish effluent limits or restrictions in terms of the amount, rate, or concentration of pollutants facilities may discharge into the water. The act also requires that dischargers meet secondary or other minimum levels of treatment. In instances where the treatment is not sufficient to reduce water pollution to achieve water quality standards established by a State or EPA, advanced waste treatment must be installed.

NPDES permits are issued either by EPA or States 1/ having EPA-approved permit programs. As of November 15, 1982, EPA had approved

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1/The term "State" as defined in the Federal Water Pollution Control Act and used in this report includes the 50 States, the District of Columbia, the Commonwealth of Puerto Rico, the Virgin Islands, Guam, American Samoa, and the Trust Territory of the Pacific Islands.

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and delegated NPDES permit program responsibility to 35 States. EPA administers the permit program in the remaining 21 States.

It has been a common practice for State regulatory agencies or EPA to develop a single set of effluent limits and issue an NPDES permit requiring a facility to meet the limits year round. The effluent limits are usually developed to maintain water quality during a critical period of time, such as when streamflow is low and temperature high. Because the permit requires a facility to meet the effluent limits year round, the facility must provide the same level of treatment regardless of changes in streamflow and temperature despite the fact that the level of treatment may not be needed to maintain water quality year round.

VEL's allow levels of treatment to vary depending on the season and/or streamflow. For example, VEL's would allow municipal advanced waste treatment facilities to operate as low as secondary treatment during part of the year and still maintain water quality. Mathematical modeling, if performed properly, can assure that water quality standards are maintained.

EPA has already recognized the cost-saving advantages associated with varying the effluent limits by season. EPA's March 1979 policy requires communities requesting construction grant funds for facilities providing greater than secondary treatment to consider seasonal effluent limits. EPA decided not to issue a policy regarding the use of seasonal effluent limits for facilities already constructed and operating because of the current emphasis on reducing Federal involvement in environmental programs.

OBJECTIVES, SCOPE, AND METHODOLOGY

We made this review to explore potential ways of reducing construction and operating costs of the advanced waste treatment program while maintaining water quality. Specifically we wanted to determine the extent to which States are using VEL's and the actual or estimated cost savings of using VEL's. Our review was performed in accordance with generally accepted government audit standards.

EPA data showed that 640 municipal treatment plants operating in 33 States have effluent limits more stringent than secondary. These treatment plants have a flow of 3,861 million gallons per day. (See enc. I for data by State.) We contacted 18 of the 33 States for information on their use of VEL's, cost savings resulting from VEL's, and the pollutants to which VEL's would most likely apply. Where States had not developed or were not using VEL's, we asked the reasons why. The States were not selected at random; rather, we primarily selected States with a large number of operating advanced waste treatment facilities and/or where the total

daily flow from the facilities was significant. Overall, the 18 States accounted for about 87 percent of the total number and about 96 percent of the total flow of advanced waste treatment facilities in the 33 States.

We also interviewed EPA headquarters and regional office officials concerning the use and cost savings associated with VEL's and contacted several private consultants for their views on VEL's. We reviewed several professional papers on the applicability and use of VEL's. (See enc. II for a list of the consultants contacted and professional papers reviewed.)

VEL's HAVE LARGE SAVINGS POTENTIAL

Federal, State, and local officials readily agreed that savings can be realized by using VEL's. Cedar Rapids, Iowa, for example, proposed a seasonal variation in its effluent standards to limit ammonia, estimating that this would reduce the cost of ammonia removal by $370,000 each year, or 7.1 percent of projected operating costs.

A 1980 study by Georgia's Environmental Protection Division estimated that use of monthly VEL's at 19 secondary or advanced municipal facilities in Georgia could reduce annual operating costs from 2 to 19 percent depending on the facility and that annual savings of $3.3 million, an average savings of 8.9 percent, appeared to be achievable. The study estimated that the use of VEL's could reduce the capital costs for 11 of the 19 facilities by $21 million, or 9 percent less than their estimated costs for meeting single effluent limits year round. The study also estimated that by extrapolating the cost savings at the 19 facilities to all municipal facilities in the State of Georgia where the same approach can be used, savings of $50 million in capital costs and $4.2 million in annual operating costs may be realized. The Georgia study concluded that hundreds of millions of dollars annually could be realized in operating costs for facility owners if VEL's were used nationally. The study also indicated that additional substantial savings may result if VEL's were used for industrial treatment facilities.

The Chief of the Water Quality Evaluation Section of the Wisconsin Department of Natural Resources told us that the use of VEL's could save the State's paper industry millions of dollars in construction and operating costs on the Fox and Wisconsin Rivers alone. The former Chief of EPA's Engineering and Economics Section told us that EPA's experience with VEL's in new advanced treatment facility construction indicated that using VEL's could reduce capital construction costs on some projects by 50 percent or more.

VEL's HAVE NOT BEEN WIDELY USED

Some States have established VEL's for biochemical oxygen demand, ammonia, suspended solids, chlorine, and temperature. However, despite the potential for substantial cost savings, States have not made extensive use of VEL's. Of the 18 States we contacted, 17 do not use VEL's for all treatment plants. These 17 States account for 94 percent of the total flow for advanced waste treatment facilities in the 33 States. Eleven of the 17 States have regulations permitting VEL's for some pollutants, but the remaining 6 States have no VEL's for any pollutants.

The States gave us varying reasons for not using or not developing VEL's. A Texas Department of Water Quality official told us that the State does not have VEL permits for flow because they are too difficult to enforce. An official of the Ohio State EPA told us that local governments have not applied for VEL's. A California State Water Resources Control Board official told us that while VEL's were used for facilities located on streams, they would not be appropriate for facilities located on lakes or estuaries.

Federal, State, and local officials we contacted generally favored the concept of using VEL's but indicated that problems could develop in actual use. They stressed that strong State management is necessary to assure that water quality standards are maintained. Some of the problems they cited include:

--Additional water quality evaluations may be required, which would divert funds from other evaluation work.

--Some communities cannot operate their treatment plants with the precision needed to allow variations in effluent limits.

--Some water bodies, particularly lakes and estuaries, retain the discharge effluent for long periods of time. Even though water quality may not deteriorate immediately, it may do so in the future.

--Accurate streamflow data may not be readily available because the Geological Survey did not obtain that data on all streams. The data is needed to allow local operators to vary treatment levels depending on streamflow rate.

We recognize that these problems must be dealt with for VEL's to be used. In some cases, data needs and operating problems cannot be overcome in the short term, and the VEL concept cannot be used on some water bodies. However, EPA is delegating additional program responsibilities to the States at the same time that Federal funds to carry out these programs, including constructing waste treatment facilities, are being reduced. The opportunity VEL's provide for reducing the cost of building and operating treatment facilities

should help to provide sufficient incentive to the States to try to overcome the problems.

EPA VIEWS

We discussed the use of VEL's and their potential for reducing construction and operating costs with EPA headquarters officials including the Chief, NPDES Programs Branch, Office of Water Enforcement, and the former Chief, Policy and Guidance Branch, Office of Water Program Operations. These officials agreed that VEL's are a worthwhile technique for cutting treatment plant construction and operation costs. They said that the most dramatic cost savings to date involve the ammonia standards and the reduced need for nitrification facilities. They cautioned that obtaining reliable national cost savings would require making a cost analysis for each project. These officials told us that because of the current emphasis on reducing Federal involvement in environmental programs, EPA would have difficulty requiring the States to allow the use of VEL's.

Although EPA may not desire to mandate the use of VEL's by the 35 States where EPA has delegated permitting authority, it can emphasize the potential cost savings of using VEL's and encourage and provide technical assistance to those States to promote greater use of VEL's. State and local governments are under increasing pressures to reduce expenditures. We believe that EPA publicity on how VEL's may reduce construction and operating costs of advanced waste treatment facilities while maintaining water quality may provide the needed incentive to States and local governments to use VEL's. In the 21 States where it has permitting responsibility, EPA could use VEL's whenever practical.

CONCLUSIONS

The use of VEL's offers States and local governments an opportunity to reduce the cost of constructing and operating municipal and industrial advanced treatment facilities while maintaining water quality. Some States with advanced treatment facilities have developed regulations permitting VEL's for some pollutants, but not all of them use them. Other States have no VEL's for any pollutants. EPA direction on the use of VEL's along with technical assistance to develop VEL's should help to stimulate greater use of VEL's at the State and local government levels.

RECOMMENDATION

We recommend that the Administrator, EPA, direct the Assistant Administrator for Water to issue a directive pointing out the possible cost savings of using VEL's and encouraging delegated States to use them to the extent possible when issuing initial or reissuing expired NPDES permits. The Administrator should also direct EPA

Regional Administrators to use VEL's to the extent possible in the 21 States where EPA administers the permit program and to work with and provide any needed technical assistance on using VEL's to the 35 delegated States.

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As you know, 31 U.S.C. 720 requires the head of a Federal agency to submit a written statement on actions taken on our recommendations to the Senate Committee on Governmental Affairs and the House Committee on Government Operations not later than 60 days after the date of the report and to the House and Senate Committees on Appropriations with the agency's first request for appropriations made more than 60 days after the date of the report.

We are providing copies of this report to the Chairmen, House Committee on Public Works and Transportation and the Senate Committee on Environment and Public Works; to other congressional committees; to the Director, Office of Management and Budget; and to your Assistant Administrator for Water.

Sincerely yours,

J. Dexter Peach
Director

ENCLOSURE I

TREATMENT PLANTS MORE STRINGENT THAN SECONDARY

State	Total plants per state	Total flow in millions of gallons per day
Alabama *	8	69.22
Arkansas	7	8.48
California *	25	339.03
Colorado	9	5.13
Connecticut	2	2.18
Florida *	9	80.85
Georgia *	14	30.72
Hawaii	1	.20
Illinois *	38	914.85
Indiana *	31	189.04
Iowa *	2	6.38
Kentucky	11	11.59
Maryland	3	3.65
Massachusetts	4	4.22
Michigan *	102	1172.31
Minnesota	8	8.86
Mississippi	9	6.01
New York *	15	87.55
North Carolina *	31	71.28
Ohio *	82	165.14
Oklahoma *	2	12.40
Oregon *	10	100.82
Pennsylvania *	91	123.56
South Carolina	11	31.56
South Dakota	2	1.18
Tennessee *	25	92.92
Texas *	13	51.79
Utah	6	18.86
Vermont	1	.15
Virginia *	1	25.56
Washington	2	27.12
West Virginia	8	19.76
Wisconsin *	57	178.63
	640	3861.00

*These are the 18 States we contacted.

ENCLOSURE II

LIST OF CONSULTANTS CONTACTED AND PAPERS REVIEWED FOR INFORMATION ON VEL's

Consultants:

Mr. James J. McKeown
Technical Analyst, National Council of the Paper Industry for Air and Stream Improvements, Inc.
Tufts University

Mr. James C. Lamb III
Professor of Sanitary Engineering
University of North Carolina

Mr. Jack Kinney
Ann Arbor, Michigan

Professional papers:

"Water Quality Modelling of the Lower Fox River for Wasteload Allocation Development," Wisconsin Department of Natural Resources, Jan. 1980.

"A Survey of the Use of Seasonal Effluent Standards," James C. Lamb III, Morris A. Shiffman, and Samuel A. Duletsky, Sept. 1980.

"Treatment Costs Savings Through Monthly Variable Effluent Limits," Georgia Environmental Protection Division, Oct. 1980.

"Selected Issues and Recommendations for Developing Dissolved Oxygen Standards," James J. McKeown, Dec. 1981.

"Feasibility of Increased Flexibility in Water Pollution Control Standards," James C. Lamb III, Apr. 1982.