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• Response to Bedminster Sewer Report

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JUDGE SERPENTELLI'S CHAMBERS

RULS - AD - 1984 - 400

RESPONSE TO THE BEDMINSTER

SEWER REPORTS

October 3, 1984

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October 3, 1984

Honorable Eugene D. Serpentelli, J.S.C.
Superior Court of New Jersey
Ocean County Court House
Toms River, NJ 08753

Re: Allan-Deane vs. Bedminster Township

Dear Judge Serpentelli:

Enclosed please find my report entitled "Response to the Bedminster Sewer Reports." The report is submitted in accordance with your letter of August 3, 1984, and is a response to the Coppola report received by Dobbs on September 7, 1984, and the Callahan and Ferrara reports received by Dobbs on September 13, 1984.

Very truly yours,

Robert M. Hordon

Robert M. Hordon

RMH/mk

cc: Joseph L. Basralian, Esq.
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Outline

- A. Introduction
- B. Wastewater Treatment for the Dobbs Site
- C. Current Operation and Expansion Plans for the EDC Plant
 - 1. Total Dissolved Solids
 - 2. Phosphorous
 - 3. Nitrogen
- D. Timing
- E. Wastewater Flow Estimates
- F. Water Supply for the Dobbs Site
- G. Compliance Using the Current EDC and Proposed Dobbs Plants
- H. References Cited

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A. Introduction

The purpose of this report is to respond to the following reports and memos:

1. Callahan, Neil V. Memo to George Raymond re: "Sewage Alternatives: Mount Laurel II Housing, Bedminster Township," April 6, 1984, 7 pp.
2. Callahan, Neil V. Memo to Judge E. D. Serpentelli re: "Environmental Disposal Corp.'s Current Expansion Program," Sept. 11, 1984, 4 pp.
3. Coppola, Richard T. Report to Judge E. D. Serpentelli re: "Bedminster Township vs. Allan-Deane," Sept. 5, 1984.
4. Ferrara, Raymond A. "Water Quality Impact Assessment for the Environmental Disposal Corporation Treatment Plant Expansion," Sept. 1984, 63 pp.

Other references will be cited in this response report where appropriate.

B. Wastewater Treatment for the Dobbs Site

An onsite tertiary treatment plant with denitrification and subsurface disposal can be expeditiously built on the Dobbs site in Bedminster. The wastewater disposal system can accommodate the estimated flow of 278,400 gpd (gallons/day) from the total number of 1,160 units, of which 232 (or 20 percent) will be low and moderate income units.

The tertiary treatment plant would consist of a totally enclosed, architecturally compatible building which would house the Rotating Biological Contactors (RBC), clarifiers, and denitrification facilities. The advantages of the RBC system are as follows:

- a) economics (low power requirements);
- b) relatively rapid installation of pre-engineered units;
- c) low maintenance costs;
- d) low noise levels.

Since the development of the RBC in Europe during the late 1950's, they have been installed in over 700 treatment plants in West Germany, France and Switzerland. The treatment plants in New Jersey using RBC units range in size from 100,000 to 16,000,000 gpd. Thus, there is nothing unusual about the size proposed for the Dobbs site (278,400 gpd).

Following denitrification, the highly treated effluent would be piped to onsite subsurface disposal fields. Based on the Somerset County Soil Survey, the best soils on the Dobbs site for land disposal are the Birdsboro (BdB) soils. These are deep, well drained soils which developed on the terraces along the major rivers of the area, such as the Raritan.

The amount of Birdsboro (BdB) soil above the 500-year flood limit is estimated to be 18.8 acres. Since the area required for the disposal fields is estimated to be 13.4 acres, additional

land is available for disposal field rotation which would improve the quality of the final effluent.

From an environmental and water quality management viewpoint, subsurface disposal of treated effluent is highly desirable for the following reasons:

- a) additional purification of the effluent is accomplished by percolation through the soil column;
- b) the direct impact on the North Branch Raritan River (or any river) is eliminated;
- c) the ground water is recharged.

The treatment plant for the Dobbs site could be operational within a relatively short time, since the plant incorporates established technology and the system is similar to others in the state which have been reviewed and approved in about one year. Following regulatory approval, it is estimated that the onsite treatment facility could be operational in one year. Thus, the total time required is estimated to be only two years. In addition, construction of the housing units could commence simultaneously with the construction of the treatment plant so that residential units would be ready for occupancy upon completion of the plant.

In sum, an onsite tertiary treatment plant with subsurface disposal is the most effective and environmentally preferred method of handling the effluents from the Dobbs site.

C. Current Operation and Expansion Plans for the EDC Plant

The Environmental Disposal Corp. (EDC) treatment plant on the North Branch Raritan River has a design capacity of 850,000 gpd. Current flows to the plant are only a fraction of this capacity and it presumably will be several years before the design capacity will be reached. Therefore, any evaluation of the ability of this plant to meet the effluent limitations specified in NJPDES Permit No. NJ 0033995 will really not be known until the flows to the plant increase to a higher proportion of the design capacity.

Thus, even though the ability of the receiving watercourse (North Branch Raritan River) to assimilate the full load of 850,000 gpd of effluent, is not known and will not be known for several years, the EDC plans to expand the plant to 1,750,000 gpd. Several issues immediately emerge from this expansion plan.

To begin with, it is apparent that serious questions about the assimilative capacity of the North Branch Raritan River to handle certain contaminants, particularly during the low flow summer period, have been raised before. For example, A.L. Ferguson states in his April 6, 1984 letter to G. M. Raymond (pp. 4-5):

Many studies have shown that the Dobbs' site contains good soils for spray irrigation. Accordingly, the Township will undertake to make available whatever portion of the Dobbs' tract is necessary for a spray field to accept any excess effluent from the EDC plant or the Township plant which cannot be discharged to the North Branch of the Raritan River because of environmental or administrative limitations.

Note that Ferguson's comments refer to "...excess effluent from the EDC plant or the Township plant...." The Ferguson letter is not clear what quantities of effluent from what plant (Township and/or EDC plant) are being referred to. Presumably, the statements do not pertain to the full expansion of the EDC plant to 1,750,000 gpd since this quantity was not mentioned in the letter. Ferguson (p. 4) does mention the possibility of a 200,000 gpd expansion at the Township plant. Since the proposed EDC expansion to 1,750,000 gpd is substantially larger than the suggested Township expansion of 200,000 gpd, it is apparent that the assimilative capacity of the North Branch Raritan remains a source of concern.

In the same vein, G. M. Raymond states in his "Compliance Report" to the Court of April 11, 1984 (p. 13):

Approval by NJDEP of a significant expansion of the EDC plant (to a capacity of some 1.6-1.7 million gals/day) may be contingent upon assurances that, during dry weather when river flow volume is low, a portion of the effluent could be discharged to ground water.

Raymond continues in his 4/11/84 report (p. 13) about the possibility of using the Dobbs tract "...for spray irrigation purposes should the EDC plant be found to excessively degrade the waters of the North Branch of the Raritan River."

N. V. Callahan states in his memo of April 6, 1984 to G. M. Raymond (p. 3):

The technical constraints on expansion of the EDC facility are ... the assimilative capacity of the North Branch of the Raritan River. It is the position of EDC that the use of "Best Available Technology" (BAT) is clearly a necessity. If ... it is necessary to meet water quality

requirements which call for treatment levels higher than BAT, then EDC might well look to a limited land based effluent disposal ... program. The ... program would ... discharge a portion of the effluent to ground water during identified low flow period of the river

Callahan goes on to mention the "... potentially suitable soils..." on the Dobbs tract as a prime candidate area for the effluent from the EDC plant which would not be permitted to be discharged into the North Branch Raritan.

R. A. Ferrara wrote a report in Sept. 1984 for the EDC entitled "Water Quality Impact Assessment for the Environmental Disposal Corporation Treatment Plant Expansion." Based upon water quality models and the limited data available at this time, Ferrara predicted that concentrations of several parameters will exceed standards during low flow conditions in the North Branch Raritan when the EDC plant is operating at 1,750,000 gpd. The water quality parameters of concern are Total Dissolved Solids (TDS), Total Phosphorous (TP), and nitrogen.

1. Total Dissolved Solids (TDS)

Total dissolved solids consist of inorganic salts, small amounts of organic matter, and dissolved materials. Excessive levels of TDS are objectionable in drinking water supplies because of possible physiological effects, unpalatable mineral tastes, and higher costs for water treatment (USEPA, 1976). High TDS concentrations can also impact the aquatic ecosystem.

State water quality standards for FW2.N waters (such as the North Branch Raritan) require that TDS concentrations not exceed 500 mg/l or 133% of background, whichever is less. In terms of

future conditions, Ferrara (1984, p. 26) notes that:

At an EDC discharge rate of 1.75 mgd, the 133% criterion (assuming average values for background concentrations) is predicted to be exceeded approximately ten percent of the time.

As a consequence of this and other conditions, Ferrara (1984, p. 28) states that:

Considering these facts and the costs of wastewater treatment to attain a TDS effluent limitation of less than 500 mg/l, a waiver of the 133% criterion is warranted (underlining added).

Thus, it is apparent that the relaxation of the TDS water quality standard would be necessary in order to accommodate the expanded EDC discharge. It is worth noting here that no such relaxation of water quality standards is necessary in the wastewater treatment system proposed for the Dobbs tract.

2. Phosphorous

High phosphorous concentrations are associated with accelerated eutrophication of waters and excessive growth of aquatic plants. Concentrations in excess of 0.1 mg/l may also interfere with coagulation in water treatment plants (USEPA). Algal growths can also impart undesirable tastes and odors to water supplies. Thus, the USEPA (1976) recommends that total phosphorous (TP) concentrations should not exceed 0.05 mg/l in any stream at the point where it enters the lake or reservoir and 0.1 mg/l in streams not discharging directly to a lake or reservoir.

FW2.N water quality standards for TP are 0.1 mg/l. Existing concentrations in the North Branch Raritan are above the 0.1 mg/l level. The State has plans to build a reservoir at the confluence of the North and South Branch Raritan Rivers (Confluence Reservoir). At such a time, it is reasonable to assume that the state will be particularly concerned with the amount of phosphates coming into the reservoir and that current water quality standards would be maintained if not strengthened. Note that the EDC discharge is only 9 miles upstream of the proposed Confluence Reservoir. In this context, Ferrara (1984, p. 35) states:

... that very low flows (less than five percent of the time) and an EDC discharge rate of 1.75 mgd, TP increases in the North Branch Raritan River will exceed those originally permitted at an EDC discharge rate of 0.85 mgd if phosphorous is assumed to be a conservative substance (underlining added).

The degree of natural self-purification for TP in the tributary prior to entering the North Branch Raritan is not fully known at this time. Ferrara recommends a stream monitoring program for a period of several years which will accumulate data which can then be used to estimate the magnitude of the impact on the river. Clearly, more information is required in order to reach a reasonable decision on the impact of an important water quality parameter (TP) on receiving water and that this information will take years to accumulate.

In marked contrast to the uncertainties associated with TP discharges from an expanded EDC facility, the onsite treatment system proposed for the Dobbs site should not contravene any

water quality standards for TP since phosphates tend to be adsorbed onto soil particles which is part of the treatment process itself.

3. Nitrogen

Since increases in nitrogen can lead to increased biostimulation and accelerated eutrophication, it is appropriate to consider the impact of this parameter on receiving waters. Although the eutrophication potential from nitrogen increases is probably less than for phosphates, there will be a measurable increase from an expansion of the EDC facility. For example, Ferrara (1984, p. 44) states that:

At an EDC discharge rate of 1.75 mgd, effluent ammonia-nitrogen + nitrate-nitrogen concentration of 2.5 mg/l, and the MA7CD10 stream flow, North Branch concentrations are predicted to increase 38% above existing conditions.

For other low flow conditions, Ferrara (1984, p. 44): "... predicts a greater than 17% increase less than 10% of the time."

Again, continued water quality monitoring for a period of several years is recommended by Ferrara so that additional data can be obtained so as to properly assess the impacts of the EDC discharge. This recommendation is necessary as it reflects the difficulties associated with a water quality impact evaluation based upon a limited data set and very small amounts of effluent discharge as of now.

The onsite treatment system proposed for the Dobbs tract stands in marked contrast to the uncertainties associated with the EDC proposal. The denitrification treatment will eliminate

the bulk of the nitrates commonly found in effluents and therefore there will be no problem and no possible downstream impacts.

In sum, the environmental uncertainties and possible contraventions of water quality standards associated with the EDC expansion would not be found in the Dobbs proposal. No waivers or other relaxation of standards will be asked for in the wastewater system proposed for the Dobbs tract. Whether the EDC expansion will result in substantial water quality degradation cannot be answered at this time. There are many uncertainties which can only be clarified after several years of data acquisition. It is worthwhile repeating again - the EDC proposal is based on surface water discharge into a sensitive reach of the North Branch Raritan upstream of the proposed Confluence Reservoir whereas the Dobbs proposal is based on ground water discharge and renovation through the soil column.

D. Timing

Callahan estimated in his April 6, 1984 memo that it would take 43 months to have a permit to operate for an expanded EDC plant. No change in this estimate was made in Callahan's Sept. 11, 1984 memo. However, Ferrara made certain observations in his Sept. 1984 report that bear on, and significantly increase, the timing estimates for the EDC plant.

For example, Ferrara (1984, p. 47) states that:

... flows as high as 1.75 mgd could not be handled with the existing system even under a revised operation. A detailed design and reevaluation of current capacity must be undertaken to better identify the required facilities (underlining added).

Since detailed treatment works design for an advanced waste treatment (AWT) plant like the EDC facility is estimated to take 6-12 months, it is difficult to see how Callahan maintains his 3-month estimate in the light of Ferrara's comment and other experience.

In contrast to the longer time required for the EDC treatment plant re-design, the pre-engineered modular RBC units proposed for the Dobbs tract are much simpler and will consequently take less time to install.

Callahan also estimates in his 4/6/84 memo that river impact analysis and models will take only 2 months. Yet Ferrara continually states that years of stream monitoring are necessary in order to assess the impact of the current EDC discharge, much less the expanded discharge to 1,750,000 gpd. To cite just one instance, Ferrara (1984, pp. 47-48) states that:

A period of several years will pass before the EDC discharge rate will reach the currently permitted 0.85 mgd. A stream water quality monitoring program is imperative during this period. The information obtained will be invaluable in confirming whether or not any detrimental effect potentially exists at extremely low flows (i.e., less than five percent of the time) with a discharge rate of 1.75 mgd and the effluent limitations of Table 1 (underlining added).

Ferrara clearly recognizes the need for additional water quality data during the next several years to assist in a full evaluation of the impacts associated with an expanded EDC plant.

Some of the assumptions made by Callahan in his 4/6/84 memo regarding the time table for the Dobbs site require correction, since it appears that Callahan's schedule for Dobbs is more pessimistic (and therefore longer) than his schedule for the EDC plant. For example, Callahan's 8-month estimate for detailed soil and site investigation for the disposal fields is substantially greater than the 1-2 month estimate offered by consulting firms which specialize in such work. Another discrepancy must be noted between the 18-month estimate used by Callahan for construction and the 30 weeks - 12 months estimate offered by local representatives who have built and are now building similar types of treatment plants in New Jersey. In this context, the 120,000 gpd Chatham Glen RBC plant in Morris County was constructed and installed in approximately one year following the necessary governmental approvals.

The 100,000 gpd "Bald Eagle" townhouse development and treatment plant in West Milford, Passaic County has some very similar features to that proposed for the Dobbs site. Specifically, both plants would use an enclosed RBC process with denitrification and subsurface disposal. All of the necessary approvals for Bald Eagle were obtained in about one year and the plant is now almost completed (Telephone interview with F. Loscalzo, P.E., Sept. 28, 1984).

Summarizing, it is estimated that the Dobbs treatment plant can be operational in less time than the EDC expansion. This statement is predicated on the comparative simplicity of the RBC and disposal field design which has been done for other plants in

the State and is therefore somewhat routine. It is recognized that detailed soil investigation on the Dobbs tract would be necessary, but this can be accomplished in a relatively short amount of time by firms which specialize in such work. There is nothing unusual about the Birdsboro soils on the site which would make soil testing difficult. Indeed, the Birdsboro soils are generally the most suitable soils for subsurface disposal. Consequently, it is estimated that the onsite treatment facility proposed for the Dobbs site can be operational in about one year following regulatory approval. Construction of the housing units could commence simultaneously with the construction of the treatment plant so that residential units could be ready for occupancy upon plant completion.

E. Wastewater Flow Estimates

R. T. Coppola used a wastewater flow estimate of 240 gpd/DU (dwelling unit) in his various planning reports to Bedminster. If we assume that Coppola was referring to multi-family dwellings and if we use the NJDEP (1978) estimator of 75 gpcd, then the average number of persons/DU would be as follows:

$$\frac{240 \text{ gpd/DU}}{75 \text{ gpcd}} = 3.2 \text{ persons/DU (dwelling unit)}$$

Considering recent demographic trends (fewer people/DU), the 3.2 persons/DU estimate is probably on the high side. However,

for purposes of consistency, the same estimator was used for the Dobbs site and the wastewater flow was estimated as follows:

$$1160 \text{ DU (240 gpd/DU)} = 278,400 \text{ gpd}$$

The projected wastewater generation rates used by N. V. Callahan and referred to by Ferrara (1984, p. 4) are based upon an average occupancy of 2.5 persons/DU and a per capita flow rate of 75 gpd. If these values were applied to the Dobbs proposal, the revised wastewater flows would be as follows:

a) $75 \text{ gpcd (2.5 persons/DU)} = 187.5 \text{ gpd/DU}$

b) $1160 \text{ DU (187.5 gpd/DU)} = 217,500 \text{ gpd}$

The 217,500 gpd estimate is 22 percent less than the 278,400 gpd estimate which of course would mean that even less area for disposal fields would be required. The disposal field area requirements for both estimates can be summarized as follows:

a) $278,400 \text{ gpd (2.10 sq.ft./gpd)} = 584,640 \text{ sq.ft.}$

$= 13.4 \text{ acres}$

b) $217,500 \text{ gpd (2.10 sq.ft./gpd)} = 456,750 \text{ sq.ft.}$

$= 10.5 \text{ acres}$

In either case, both estimates are well under the 18.8 acres of Birdsboro (BdB) soils which are at a higher elevation than the 500-year flood limit. (See Hordon's 8/31/84 report for additional details on the soils).

F. Water Supply for the Dobbs Site

R. T. Coppola states on p. 8 of his Sept. 5, 1984 report to the Court entitled, "Site Identification Map and Site Development Potential" that the Dobbs site is not now served by public water. This statement totally ignores the 16-inch Commonwealth Water Co. main which runs along Route 206 in Bedminster and is therefore incorrect.

G. Compliance Using the Current EDC and Proposed Dobbs Plants

Bedminster can move very close to satisfying compliance with Mount Laurel II requirements by using the current EDC capacity and simply adding in the proposed Dobbs plant, as follows:

	<u>Estimated gpd</u>
Bedminster Subtotal (Ferrara, 1984, p.4)	600,938
less HDC Commercial	- 43,750
less Pluckemin Village	- 27,500
less City Federal (commercial)	- <u>22,500</u>
Residential Subtotal	507,188

507,188 gpd = 2,705 DU

187.5 gpd/DU

2705 DU (0.20)	=	541	low and moderate income DU
(Dobbs site)	+	<u>232</u>	" " " " "
Total		773	

Therefore, Bedminster could come close to satisfying almost all of its low and moderate income housing requirements by using the combined capacity of the current EDC plant and the proposed Dobbs plant. Additionally, if the capacity of the EDC plant set aside for Bernards (243,725 gpd) were to be used in Bedminster along with construction of the Dobbs plant, expansion of the EDC plant would not then be necessary for purposes of compliance.

H. References Cited

1. Callahan, Neil V. Memo to George Raymond re: Sewage Alternatives: Mount Laurel II Housing, Bedminster Township, April 6, 1984, 5 pp.
2. Callahan, Neil V. Memo to Judge E. D. Serpentelli re: "Environmental Disposal Corp's Current Expansion Program," Sept. 11, 1984, 4 pp.
3. Coppola, Richard T. Report to Judge E. D. Serpentelli re: "Bedminster Township vs. Allan-Deane," Sept. 5, 1984.
4. Ferguson, Alfred L., Esq. Letter to George Raymond re: Sewer Capacity Availability in Bedminster Township, April 6, 1984, 5 pp.
5. Ferrara, Raymond A. "Water Quality Impact Assessment for the Environmental Disposal Corporation Treatment Plant Expansion," Sept. 1984, 63 pp.
6. Hordon, R. M. "A Proposed Onsite Tertiary Wastewater Disposal System for the Dobbs Site in Bedminster, Somerset County, New Jersey," Aug. 31, 1984, 22 pp.
7. Loscalzo, Frank, P.E. Telephone interview on Sept. 28, 1984.
8. New Jersey Dept. of Environmental Protection (NJDEP). "Standards for the Construction of Individual Subsurface Disposal Systems," July 1, 1978, 32 pp.
9. Raymond, George M. "Report on Compliance with the Mount Laurel II Mandate by Bedminster Township, New Jersey," April 11, 1984, 23 pp.
10. U.S. Environmental Protection Agency (EPA). Quality Criteria for Water. 1976, 256 pp.