

STATE OF CALIFORNIA
STATE WATER RESOURCES CONTROL BOARD

In the Matter of the Petitions)
of CONTRA COSTA COUNTY SANITATION)
DISTRICT NO. 7-A for Review of)
Final Decisions of the Division)
of Water Quality Regarding Grant)
Eligibility. Our Files Nos. G-45,)
G-50, G-51 and G-52.)

Order No. WQG 80-10

BY BOARD MEMBERS MILLER AND MITCHELL:

Contra Costa County Sanitation District No. 7-A (District) has petitioned for State Board review of several final decisions of our Division of Water Quality (Division) on grant eligibility of certain costs involved in the District's project. On September 20, 1979, the State Board decided to hold a hearing prior to taking final action on the petitions. The hearing was held on December 21, 1979, with State Board members Miller and Mitchell serving as hearing officers. The hearing record was held open until January 25, 1980, to allow the District to submit additional information on the issue of eligible sizing of the sludge processing equipment.

I. ISSUES

Five decisions by the Division are under review. Three of the decisions involved equipment proposed by the District which the Division found ineligible. The equipment included:

1. Permanently installed hydrogen sulfide and combustible gas detection and alarm systems;
2. One portable drain pump;
3. One suspended solids meter.

The remaining two decisions under review are:

1. A determination by the Division which limited the grant eligibility of a portion of the sludge handling facilities proposed by the District;
2. A determination by the Division which limited total eligible Step II design costs for the District's treatment plant.

Each decision in question is separately discussed below.

II. EQUIPMENT ELIGIBILITY

1. HYDROGEN SULFIDE AND COMBUSTIBLE GAS DETECTION EQUIPMENT.

(a) Background. The District proposed to install six permanent hydrogen sulfide and combustible gas detection and alarm systems as part of its project. The Division determined that the proposed detection systems were unnecessary and therefore ineligible. The basis for this decision was that the project already provided for control of gas generation as part of the collection system, the wet wells were ventilated, and hydrogen sulfide at very low concentrations could be detected without equipment. In its petition for review, the District requested a determination of eligibility for either permanently installed

equipment or portable detection equipment. At the hearing the Division agreed that gas detection equipment for this project was reasonable and necessary. The Division recommended grant funding of three (3) portable detection units for the project.

(b) Contentions. The District contended at the hearing that permanently installed gas detection equipment is required by the regulations of the California Department of Industrial Relations, Division of Occupational Safety and Health (CAL/OSHA). The Division's present position is that portable detectors meet the CAL/OSHA requirements, are more cost effective than permanently installed detectors, and in many cases will provide a safer working condition than permanent equipment.

(c) Findings. Discussions with representatives of CAL/OSHA indicate that portable gas detection units will comply with their safety requirements particularly where, as in this case, the areas concerned provide for ventilation. It also appears that portable equipment, in many ways, actually insures a safer working environment than permanent equipment for the following reasons:

1. Hydrogen sulfide is corrosive to the probes of the permanent equipment and without proper maintenance, meter readings might not be accurate.

2. Maintenance of permanent equipment would be more difficult because the equipment is itself located in the potentially dangerous and corrosive environment.

3. Hydrogen sulfide levels could vary throughout the work area and dangerous levels of contamination at place of employee work might not be detected by permanently mounted probes, i.e., probes located at levels above sumps.

4. Permanent equipment may provide a false sense of safety.

Portable units are also more cost effective. The cost savings of funding three portable units versus six permanent installations amounts to about \$20,000.

Accordingly, we find that the cost of three portable detection units for this project is a reasonable and necessary project cost. The primary basis for this decision is not cost savings but the fact that portable units, in this case, should provide a greater degree of safety. Some evidence was produced on the cost of various portable units. We therefore add one comment. Insuring safe working conditions in grant funded projects is critical. Accordingly, the Division's review of safety equipment should be liberal. Portable units which are reasonably satisfactory to the District should be funded.

2. PORTABLE DRAIN PUMP

(a) Background. Two options for drainage facilities were considered by the District and its consultants -- permanently installed drainage facilities and purchase of a portable onsite pump. The District opted for the portable onsite pump as providing

the most cost effective solution to the problem of providing equipment for necessary drainage capability for unit processes or in emergency situations. The Division denied eligibility on this item of equipment on the ground that the more cost effective solution would be rental of portable pumping equipment on an as needed basis.

(b) Contentions. The District basically contends that rental of portable pumping equipment is not a satisfactory solution. Emergencies which require portable pumping capability may develop quickly and at hours when rental pumps are not readily available. Even when rental equipment is available, the time lost in locating and picking up the equipment may be critical.

(c) Findings. It is impossible to determine with any certainty how often emergency pumping equipment would be needed. It does appear from the evidence that circumstances could arise where immediate availability of pumping equipment could be quite critical. Onsite equipment would be available within a half hour. Rental equipment might not be available for three to four hours, or longer, depending on a variety of circumstances. It seems to us that an important factor in the issue of onsite pumping equipment versus rental of such equipment is whether such equipment is readily available in the immediate area of the District's facilities. Uncontroverted evidence was offered by the District that they might have to go as far as Oakland or Sacramento to obtain rental equipment. Considering all of the

evidence, including the fact that the cost of onsite equipment is minor (about \$3,800), and that onsite availability of such equipment might, under certain circumstances, prevent facilities damage far exceeding the cost of such equipment, we are persuaded in this case that the equipment proposed by the District is a reasonable and necessary project cost.

We would note that, as a general proposition, rental of pumping equipment seems to be the most effective solution where such equipment is readily available. The burden of proving that rental pumping equipment may not be readily available, or that special circumstances justify grant funding of onsite equipment in a particular case rests on the grantee. On balance, we believe the grantee has carried its burden in this case.

3. SUSPENDED SOLIDS METER

(a) Background. The suspended solids meter in question is proposed to be installed in the underflow from the dissolved air floatation units. The meter would measure the concentration of suspended solids in the return flow from the dissolved air floatation units to the headworks of the treatment system. The primary function of the meter is not that of a process control. Rather, it is intended to serve an alarm function, providing notice of a possible malfunction of the dissolved air floatation units. Costs involved are minor, about \$5,000.

(b) Contentions. The District contends that the meter would provide a continuous warning system of possible malfunction

of the air floatation units thereby increasing plant reliability. The Division contended that the meter involved was generally unreliable, that intensive and frequent maintenance, including constant recalibration, of the meter was required, and that in actual practice this maintenance was not provided, thereby rendering the meter virtually useless. The Division further contended that high suspended solids in the return flow from the air floatation units would be noticed in a timely manner through routine sampling which the operators do in the normal course of their duties.

(c) Findings. The evidence indicates that the Division carried out a relatively thorough investigation into the reliability of the meter in question. The weight of the evidence clearly supports the determination of the Division that, in actual practice, the meter proposed does not function reliably. We also find that presence of high suspended solids in the return flow from the air floatation units should be discovered in a timely manner through the routine, day-to-day sampling program which should be conducted at the District's plant. Under these circumstances, the proposed meter is neither reasonable nor necessary. The District, of course, may purchase and install the meter at its own cost if the District believes that the meter will actually provide sufficient additional reliability to justify its cost and the maintenance required.^{1/}

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1. While not critical to our decision, the District was advised sufficiently in advance of the ineligibility of the meter to avoid its inclusion in plans and specifications. It also appears that the meter can be deleted from the project at possible minor expense to the District.

III. ELIGIBLE DESIGN COSTS

(a) Background. The basic issue involved at this time is the reasonableness of design engineering costs relative to design of the District's treatment plant. The plant is being constructed as a part of a regional project which will serve the communities of Pittsburg, West Pittsburg and Antioch in Contra Costa County. Estimated cost of the entire regional project is about \$40 million. Estimated cost of the plant is about \$25 million.

Design was performed by a joint venture firm composed of Camp Dresser and McKee/Koretsky, King and Associates, in conjunction with three major subcontractors -- Brown and Caldwell, Trotter-Yoder and Associates, and Dewante and Stowell. This rather complex "marriage" of engineering firms was required to satisfy the local concerns of the various municipalities involved in the overall regional project.

On May 23, 1977, the District submitted a draft copy of its proposed design engineering contract to the Division for review and approval. The proposed contract provided for payment of not more than \$2,208,159 for design of the regional project. The contract price of \$2,208,159 was based on estimated cost of design services (\$1,984,756), plus a fixed fee or profit (\$223,403) for the engineers.

On June 6, 1977, the Division advised the District by letter that:

"A cursory review of the (engineering) contract cost has been performed.... The proposed cost for the Step 2 services appears to be excessive when compared to other projects. It is the grantee's responsibility to negotiate the contract for engineering services in accordance with the provisions of 40 CFR 35.937-5. The Division of Water Quality may limit these costs to a reasonable proportionate share of the total eligible project cost."

The Division's letter also requested the District to advise the Division of the initial cost proposed by the engineer and the final negotiated cost.

The District responded by letter of June 21, 1977. The letter did not include any information on the original cost proposed by the engineer. Consequently, on June 24, 1977, the Division notified the District by letter that, while the "negotiation methodology" submitted satisfied the formal requirement of federal regulations, the Division was concerned over whether there had in fact been "meaningful negotiations" on engineering costs. The letter also notified the District that:

1. The Division would request that the EPA Audit Office evaluate the procurement of engineering services;
2. The District was authorized to award the engineering contract, but that this approval to award was not to be deemed as approval of the engineering costs involved nor of grant eligibility of the engineering costs;

3. The Division would make a determination on the reasonableness of engineering costs after review of the EPA audit evaluation and might limit costs to a reasonable proportion of eligible project cost.

On June 27, 1977, the Division by letter requested the EPA Audits Office to perform an initial pricing evaluation of engineering services for the project, noting that the Division was concerned that the District had not conducted meaningful negotiations to limit engineering costs or attempted to assure that engineering costs were reasonable.

On July 6, 1977, a meeting was held between representatives of the District, the Division, the design engineers and the EPA Audit Office. Unfortunately, the accounts of the discussions and decisions of that meeting are as varied as the participants. The District and the design engineers contend that they came away with the understanding that, short of actual fraud, the State and EPA would pay their proportionate share of actual design costs and that the only amount in question was the amount of the engineers' fee (profit). The District further contends that, based on this understanding, their evaluation was that \$50,000 to \$55,000 of the engineers' fee might eventually be disallowed. The Division contends that it was clearly indicated that both engineering costs and profits were excessive for the type of design work involved, that excess costs and fees amounted to \$400,000-\$500,000, and that the Division would limit both profit and costs to reasonable amounts. The EPA

Audit Report notes that, at the meeting, the Division advised the District that the proposed costs were \$479,246 higher than the Division's computed maximum allowable fee.

On July 13, 1977, the District authorized the design engineers to proceed to final design. The District's letter advises the engineers that additional documentation supporting the cost of design services must eventually be submitted, that the District will review the design cost estimates at critical points, and that if the "design effort is substantially less than the original manpower estimates presented to the District at the negotiation session of April 21, 1977, the District reserves the right to renegotiate the cost plus fixed fee contract."

On January 11, 1978, the EPA Audit Office furnished its Report. The Report indicates that negotiation procedures of the District were not documented. It noted that the primary issue was excessive "fees" attributable to treatment plant design, that the design engineers had proposed fees of \$1,346,645 for design of the treatment plant while the Division computed a fee of \$941,392 through use of the American Society of Civil Engineering (ASCE) curve, that, while EPA has precluded the use of ASCE curve in compensation provisions of consultant contracts, the ASCE curves represent the upper limit of reasonable compensation. The Report noted that the number of design firms could have been a contributing factor to the substantial design costs and that

after the fact comparison of incurred costs to proposed costs "is not an effective alternative to performing an adequate technical evaluation prior to the contract award." The Report included a recommendation to limit grant participation to the design costs computed by the Division "because the grantee has failed to technically justify the proposed engineering fees."

On March 29, 1978, a further meeting was held between representatives of the District and the Division. Apparently, there was no misunderstanding at this meeting. The Division indicated that design costs for the treatment plant were excessive, 50 percent higher than normal. The District was told that they must either justify the extraordinary design costs for the treatment plant or that the Division would limit grant eligibility based on 90 percent of ASCE curve "A" or comparable design costs of five similar plants. The Division indicated that, if design costs were limited, they would use whichever alternative would provide greater grant funding.

Ultimately, the Division rendered its final decision by letter of November 29, 1978. The decision can be summarized as follows:

1. Design costs for the treatment plant were excessive when compared to the ASCE curve or design costs of comparable projects.
2. There was an apparent lack of effective negotiation by the District.

3. Use of the ASCE curve results in higher grant eligibility for treatment plant design than limitation on a basis of cost of comparable projects.

4. Eligibility of basic design costs for the treatment plant will be limited to that amount derived from use of the ASCE curve.

5. The ASCE curve will be applied to the lowest contract bid price for construction of the treatment plant.

6. In use of the ASCE curve, the maximum design phase factor of 0.90 will be used rather than the normal factor of 0.85.

7. In addition to design costs based on the ASCE curve, the District will be allowed additional project management costs to cover additional administrative costs resulting from design being performed by four separate engineering firms. These costs were estimated at \$110,000.

8. In addition to the foregoing amounts, the District will be allowed reasonable actual costs for preparation of an operation and maintenance manual. These costs were estimated at \$60,000.

The final decision of November 29, 1978, was subsequently amended to allow the additional amount of \$4,796 for "redesign" of the liquid stream process and \$19,410 for design revisions resulting from value engineering recommendations. No change

has been made in the basic Division decision limiting basic design costs to the amount derived from use of the ASCE curve.^{2/}

To put the overall problem in reasonable perspective, as of the date of the hearing the District faces an apparent obligation of about \$1,824,046 to its design engineers for design services on the treatment plant.^{3/} If this obligation were fully grant eligible, federal and state grant funding (87-1/2 percent) would result in reimbursement to the District of about \$1,596,040. Under the approach of the Division, grant reimbursement will be limited to about \$1,292,741.^{4/} The actual difference in grant dollars to the District amounts to about \$303,299.

2. The background statement on the issue of design costs does not include, by any means, a complete listing of all documents or actions related to the issue. The documentary evidence and record is exceedingly voluminous. We have referenced only those documents and actions which are necessary to show the chronology of the events which lead to the present problem.
3. One of the complicating factors in the problem before us is that the plant facilities are oversized, i.e., the sizing is greater than the grant eligible sizing. Accordingly, only an incremental portion of the design and other consultant costs are grant eligible. The costs indicated above reflect only the approximate portion of incremental costs which would be grant eligible under any circumstances. The total obligations of the District for design of the oversize plant amounts to about \$1,897,490.
4. The Division's computations at the time of hearing were as follows:

(a) Eligible Basic Design Cost	\$1,283,212
(Eligible Const. Cost x ASCE curve x design factor)	
24,108,749 x 0.05914 x 0.90	
(b) Redesign Due to Value Engineering.	19,410
(c) O & M Manual Allowance	60,000
(d) Project Management Special Allowance	110,000
(e) Redesign of Liquid Stream Process	<u>4,796</u>
	TOTAL \$1,477,418
Grant Funded Portion (87-1/2 percent)	\$1,292,741

(b) Contentions. The District makes a number of contentions which we will summarize as follows:

1. The design costs incurred by the District are reasonable and should be fully grant funded for a number of reasons. Accelerated design services were required because of compliance dates. Grant rules and regulations require special services. Special efforts were required on their project because of the number of consultants involved. Other special circumstances resulted in engineering costs which, although somewhat high, are reasonable in this case.

2. There was a misunderstanding as a result of the meeting of July 6, 1977. The District understood that only the engineers' fees (profit) was in question. They assumed, at a maximum, that only \$50,000 - \$55,000 might not be grant fundable. They were under pressure to move the project forward rapidly and did so in reliance on their understanding of the July 6 meeting. The alternative would have been to delay the project and renegotiate the engineering contract. They have proceeded in good faith and should not now be punished because of a misunderstanding on the amount which might be disallowed.

3. Use of the ASCE curve to limit eligible design costs is improper and unfair.

The Division's contentions can be summarized as follows:

1. The design costs proposed were excessive and the District was so advised prior to award of the design contract. The District was further advised that grant participation in the design costs would be limited to those costs which were deemed reasonable unless the extraordinary costs were justified.

2. The extraordinary design costs have not been justified. In particular, no good faith negotiation to assure that design costs were kept to reasonable amounts has been demonstrated.

3. In the absence of justification, limitation of grant participation in design costs in the manner proposed by the Division is fair and reasonable.

(c) Findings. The public interest in effective use of available grant funds requires that all project costs be limited to those that are fair and reasonable. Under both applicable law and regulations only those costs which are reasonable are grant eligible. With very limited grant funds available, unreasonable costs on projects presently being funded results in delay of funding for other deserving projects.

To the extent that contract pricing is determined through the competitive bidding process, the public interest in assuring that only fair and reasonable costs are grant funded is protected by the competitive bid process. This process, including

the requirement of contract award to the lowest responsible bidder, basically assures reasonable cost.

Design engineering contracts, such as the one involved in this case, do not result from any cost competitive process. These contracts, including the costs thereof, are negotiated between the grantee and the engineering consultants involved. The only means of assuring that design costs are kept within reasonable limits is assuring that the grantee does negotiate in good faith with a specific view toward assuring that the design services proposed for its project are necessary and that engineering profits are reasonable.

The intent of federal regulation and our regulations on negotiated design costs are clear. The grantee must negotiate the design costs. The negotiation must be in good faith with a view to defining the scope and extent of work required, the reasonable cost thereof, and a fair and reasonable profit for the consultants. The grantee must be prepared to demonstrate that meaningful, good faith negotiations did take place and that, as a result of these negotiations, a fair and reasonable contract was arrived at. The aspect of negotiation of consultant contracts is of such significance that, if the grantee does not have the expertise to negotiate with its consultants, grant funding will be provided to the grantee so that the grantee can hire special consultants to provide the necessary expertise and to assist the grantee in negotiations.^{5/}

5. We will not cite all of the federal regulations which bear on this problem. But see, for example, 40 CFR 30.705, 30.805, 35.936-12, 35.937-5 to 35.937-7.

The Division is charged with implementing the applicable laws and regulations. The Division does not ordinarily use the ASCE to limit design costs. Rather the Division uses the ASCE curve as an indicator that design costs in a particular case may be excessive. If proposed design costs exceed the amount derived through use of the curve, the Division calls upon the grantee to do two things: (1) Demonstrate that meaningful, good faith negotiations did in fact take place; and (2) demonstrate that the proposed design costs are fair and reasonable. This procedure is precisely the procedure which was followed in this particular case. We believe that the procedure is both appropriate and necessary.

The fundamental problem in this case is that the District has not demonstrated any sort of meaningful cost negotiations with the engineering consultants. One of the facts that the Division initially requested was the price originally proposed by the engineers so that it could be compared with the final price proposed by the contract. The information was not provided when requested by the Division.^{6/} The Audit Report from EPA basically

6. The Division requested the information by letter of June 6, 1977. The District's response of June 21, 1977, did not provide the information sought. In their letter of April 29, 1978, responding to the EPA Audit Report, the District did indicate the original price proposed by the engineers. A comparison of the original price proposed with the final contract price indicates that the original proposed price was reduced by some \$5,945. This reduction appears to be solely attributable to a decrease of one subcontractor's profit from a rate of 19.8 percent

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notes that there was not documentation of negotiation on price or the quantitative and qualitative aspects of the engineers' proposal.

We attempted to clarify the extent of negotiation during the hearing on this matter, without any great success.

"MR. MITCHELL: Who did the negotiations with the people who provided the contract?

"MR. JACKSON: The initial negotiation was -- there was myself, Stan Davis from the City of Antioch, Bill Silva who at the time was the City Engineer of Pittsburg, and --

"MR. MITCHELL: There was some kind of proposal submitted to you for review and then you met with the consultants?

"MR. JACKSON: Yes, there were, and there was a second document put together that reflected those changes.

"MR. MITCHELL: How many meetings did you have on it?

"MR. JACKSON: I don't really know. I couldn't answer that truthfully. That was two and a half years ago, and too much has gone on.

"MR. MITCHELL: Was it more than a dozen?

"MR. JACKSON: I would suspect it was two or three, but there was a lot of phone conversations, and there had been a lot of preliminary meetings so that before we went into the first formal negotiation we all knew pretty much the ground rules.

* * *

"MR. MITCHELL: Well, there must have been a breakdown of some kind in terms of the different things that were going to be done by the contractor itemized in some way or another.

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6. to 18 percent. At the time of contract award, the maximum profit rate allowed by the Division was 18 percent. This minimal reduction does not, in our minds, imply any sort of meaningful cost negotiations on the part of the District.

"MR. JACKSON: Yes, that's true.

"MR. MITCHELL: And your assessment of that contract -- what I am trying to find out is what really in terms of negotiations transpired.

"DR. MILLER: What did you take issue with in what they initially submitted to you?

"MR. JACKSON: I don't remember. I would have to go back and check the files. I honestly couldn't answer you.

"MR. MITCHELL: Did you have records of that then in terms -- you say you could go back and check something.

"MR. JACKSON: I have a whole file cabinet full of stuff on this 7-A project, and I'm sure there is something in that that would give me some indication.

"MR. MITCHELL: As I understood from the staff there is no indication in the record that was given to them that showed that real negotiations occurred. That was what I wondered, if you had anything to document that.

"MR. JACKSON: ... I think we presented to them the initial negotiation document and the document that resulted after we discussed it....

"DR. MILLER: What was the difference in those two documents.?

"MR. JACKSON: I don't recall."^{7/}

The foregoing quotations do not include all of the hearing discussions on the question of negotiation of the design contract. In our estimation, they are fairly representative of the type of information provided by the District on the issue of negotiation.

It seems to us that the burden of proving a meaningful, good faith negotiation of design costs rests squarely on the

7. Reporter's Transcript, pages 176-177, 180-181.

District. On the basis of the record before us, the District has failed to carry its burden of proof, and we so find. If the District had been able to show proper negotiation, a second issue would have been presented. Given a good faith, meaningful negotiation, were the costs contracted for reasonable in the light of all the circumstances involved? Without proof of negotiation, however, the second issue never squarely presents itself. Without meaningful cost negotiation, there really is no possible way for us to determine what price for engineering services would have been arrived at had such negotiations occurred. On the basis of the record before us, we would be merely speculating on what the negotiations would have produced.

A further question does exist, however. Is the Division's determination limiting design costs fair and reasonable? Considering all of the evidence, we find that it is.

We recognize that each treatment plant project has its own special problems. There are no doubt cases where special circumstances justify extraordinary design costs. The ASCE curve does not, in our minds necessarily determine the upper limit of reasonable design cost in every case, or in any particular case.

However, experience does indicate that use of the ASCE curve generally provides a figure for basic design costs which somewhat exceeds those costs reasonably necessary for adequate design of new treatment plants. Most new treatment plants are designed at

a cost which is lower than the design cost derived through use of the curve. Under ordinary circumstances, the ASCE curve is a fairly liberal standard against which to measure the reasonableness of basic design costs for a new treatment plant.

In this case, where meaningful negotiation of cost has not been demonstrated and where costs far exceed those ordinarily anticipated, some rational approach to determine reasonable cost must be selected. The Division's use of the ASCE curve to limit "basic" design costs is reasonable. While the District's project did involve special problems, substantial additional costs for special engineering and management services were also allowed over and above the amount derived through use of the ASCE curve. On the record before us, the Division's decision is appropriate.

IV. ELIGIBLE SIZING OF SLUDGE HANDLING FACILITIES

(a) Background. Applicable regulations limit the grant eligible cost of the District's project to the cost of capacity needed to serve projected population and associated commercial flows for a period of ten years after commencement of erection of the project.^{8/} Population projections for the District's project are required to be based upon the Series E

8. "Commencement" is interpreted to mean approval to award of construction contracts.

fertility and 0 net in-migration projections of the Department of Finance (E-0) population projections). Additional grant eligible capacity is provided for existing industrial flows, future industrial flows which are committed to connect to the project, and a nominal industrial reserve capacity. Commencement of construction of the District's project was anticipated during 1978.^{9/} E-0 population projections for the project were thus based on the projected population for 1988.

The District elected to construct capacity which exceeded the grant eligible capacity. Basically, the District has designed their solids handling facilities to accommodate anticipated sludge production for the year 2000. Accordingly, the Division was required to determine what portion of that total treatment facilities proposed by the District would be grant eligible.

To handle the amount of solids anticipated by the year 2000, the District proposed dissolved air floatation thickeners (DAF thickeners) sized at 800 square feet. They also proposed two 80-foot diameter anaerobic digesters, with a depth of 29.5 feet, providing a total digester volume of 296,566 cubic feet.

During the Division's ten percent design review, the Division made determinations on the grant eligible portions of the DAF thickeners and digesters. By letter of July 27, 1978, the Division advised the District that:

9. We are informed by the District that actual commencement of construction for the project did not commence until 1979.

(1) The grant eligible DAF thickener size would be 400 square feet; and

(2) The grant eligible anerobic digester volume would be 129,590 cubic feet (the equivalent of two 53-foot diameter digesters with a depth of 29.5 feet).

In effect, this determination reflects the Division's computation of DAF thickener and digester sizing reasonably necessary to handle solids generated by the 1988 population within the District's service area (based on E-0 population projections), together with eligible industrial flows.

(b) Contentions. The District contends that the determinations of the Division on grant eligible sizing of thickeners and digesters are in error for a number of reasons, which we will summarize as follows:

(1) The treatment processes of the project are such that the design values and assumptions used by the Division in their sizing determinations result in less grant eligible capacity than the District is entitled to.

(2) The District's grant eligible sizing should be based on that sizing which is most "cost effective". One function of the facilities involves the production of methane gas. Larger size facilities than those allowed by the Division are in fact more cost effective when one considers the economic value of the additional methane gas produced from larger facilities.

The District does not contend that the total thickener and digester capacity which they are constructing should be grant eligible. On their approaches, they do contend that digester capacity of 195,780 cubic feet (the equivalent of two 65-foot diameter digesters of a depth of 29.5 feet) and DAF thickener sizing of 750 square feet should be eligible.

The basic position of the Division is that the sizing determinations made are based upon standard design values, that the design values selected for this project were "conservative",^{10/} and that the final decisions are therefore appropriate.^{11/}

(c) Findings. Determination of eligible capacity for the facilities in question -- the DAF thickeners and digesters -- ordinarily depends on a number of factors. Primarily for this project, the factors include:

(1) The eligible projected population and industrial flows:^{12/}

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10. "Conservative" is used in the engineering sense. Design values are usually expressed in standard ranges. Use of "conservative" values in sizing decisions basically means selection of a value within the standard range which will provide maximum capacity for the process in question.
 11. If the District's proposed sizing were accepted, grant eligibility for the cost of the thickeners and the digesters would be increased by about \$372,000.
 12. E-0 population projections and eligible industrial flows were not in issue at the hearing.

(2) The solids and organic loading rate (pounds per day) for these flows and the mean cell residence time of the solids under aeration to be subsequently handled by the DAF thickeners;

(3) Length of time required for digestion of the solids, i.e., decomposition of the solids.

With respect to the solids and organic loading rate, the District's consultants provided loading data for both domestic sewage and industrial contributions to the Division. Based on data supplied by the consultants, the Division then computed the amount of solids and organics which the dissolved air floatation thickeners and digesters would have to handle to the year 1988. In making the computations, a number of loading factors must be considered, including maximum solids loadings which the facilities must handle, solids content of primary sludge, solids content of sludge coming from the dissolved air floatation thickeners, the volatile solids loading rate,^{13/} and the length of time required for digestion of solids.

With respect to overall sizing of the solids handling facilities, the facilities must be of sufficient size to handle the maximum quantity of solids reasonably expected during peak loading conditions. Staff computations were based on the average daily dry weather quantity of solids which could be expected to occur during the peak month of solid loading to 1988. In very general terms, staff derived the average daily dry weather

13. Pounds of volatile solids per cubic foot of digester volume.

solids value used for the District's project from the maximum month of solids contributions. Thus, while the value derived is an average daily value, the value is actually based on the maximum monthly solids loading which is anticipated at the treatment plant.

In making their computations, Division staff assumed that the solids content of primary sludge would be 4 percent. Under normal operating conditions, standard values of solids content of primary sludge range from 5 to 7 percent. Use of the 4 percent design value resulted in greater eligible capacity for the District than use of standard values.

With respect to the solids content of sludge coming from the DAF thickeners, solids content values range from 4-5 percent under normal operating conditions. Division staff used a value of 3 percent, which again resulted in greater eligible capacity for the District than use of standard values.

In making their computations, Division staff assumed a volatile solids loading rate of 0.1. Typical standard values range from 0.1 to 0.4. Use of the 0.1 value resulted in greater eligible capacity for the District than any other standard value.

With respect to the mean cell residence time of solids in the activated sludge portion of the system to be subsequently handled by the dissolved air floatation thickeners, staff used a mean cell resident time of about five days.^{14/}

14. A great deal of testimony at the hearing was directed at the issue of mean cell residence time. It appears that the District's calculations result in a mean cell residence
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Eligible sizing for the District's project also involves the solids digestion period, i.e., the length of time allowed for decomposition of solids in digesters. In simple terms, the digesters must be large enough to allow the quantity of solids anticipated to remain in the digesters for sufficient time for the solids to decompose. The greater the digestion period allowed, the greater digester size required. Standard design values for digestion periods range from 10 to 20 days. Division staff used a digestion period of 20 days in determining eligible sizing. Use of a design period of 20 days resulted in greater digester sizing than any other value in the standard design range.

The District and their consultants contend, in substance, that the standard design values customarily used by staff apply only to solids loadings anticipated from a normal activated sludge system. They contend that their system, a dual biological system, will produce a greater quantity of solids and organics than the normal activated sludge system. According to the District, this will require greater capacity in the thickeners and digesters than the sizing computed by the Division staff.

The District's contentions are vigorously disputed by staff. The staff position is fully supported by the testimony of Dr. George Tchobanoglous, an expert from the University

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14. time of about one day for the activated sludge process. Dr. Tchobanoglous concluded that this operational mode would result in process failure. Staff use of a mean cell residence time of about five days appears appropriate.

of California (Davis). Dr. Tchobanoglous made an independent analysis of the proposed facilities of the District. He testified, in effect, that there was no reason to move out of conventional design ranges for the proposed facilities.^{15/}

As a result of the hearing and the records before us, we are satisfied that the general approach of the Division on the grant eligible capacity of DAF thickeners and the digesters are appropriate, and we so find. Eligible sizing determinations were made on the basis of data supplied by the District's consultants.^{16/} In the case of every critical design value which would affect grant eligible sizing, the Division used the design value within the standard range which would provide the District with maximum grant funding. In several cases, e.g., the value for solids content of primary sludge, the Division went

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15. The ranges of standard design values cited in this Order have been used by the Division for the past six years. They were arrived at through extensive literature searches, input from the academic community, and input from treatment plant operational personnel throughout California and other parts of the nation.
 16. The data provided by the consultants was evaluated at the 10 percent design phase. At the close of the hearing, the record was left open so that the District could provide additional documentation on loading factors which might affect digester sizing. The District did supply some additional data -- data based on the actual influent loading at the four existing treatment facilities. These influents will eventually comprise the influents to the District's project. We have carefully evaluated the data supplied. The evaluation confirms previous determinations on eligible solids handling facilities. For example, two critical design values for digesters, detention time for digestion and volatile solids loading rate using the new data were computed and compared with the Division's previous computations. The detention time was computed to be identical (20 days) using the most conservative design assumptions and there was no difference in the volatile solids loading rate.

outside of standard ranges to select a design value which would allow the District even greater grant funding than the standard range of design values.

Our review has, however, indicated one problem with the Division's determination on grant eligible sizing. As previously stated, applicable regulations provided grant eligible capacity for certain industrial flows. Eligible industrial capacity includes capacity for:

1. Industrial flows existing at the time of federal Step 2 grant award;
2. Additional flows from industries who intend to increase existing flows or locate in the service area and have supplied a letter of commitment to the grantee prior to award of federal Step 2 grant agreement;
3. A nominal reserve capacity for non-identifiable and unforeseeable industrial expansion not to exceed 10 percent of the sum of the flows under Nos. 1 and 2 above.^{17/}

The record indicates that, at the time of federal Step 2 award on the District's project, there were existing industrial flows. There apparently were no letter commitments regarding additional flows. In making their sizing determinations, the

17. See Sections 2133 and 2153, Subchapter 7, Chapter 3, Title 23 of California Administrative Code, adopted May 19, 1977. The industrial flow provisions were effective for all projects receiving federal Step 2 grant award after May 19, 1977. The date of award of the District's federal Step 2 grant was May 23, 1977.

Division included capacity for existing industrial flows. However, it appears that the Division, in making its sizing determination, did not include a nominal reserve capacity for non-identifiable and unforeseeable industrial capacity in its considerations. This factor should have been considered.

Consideration of the industrial reserve capacity allowable under applicable regulations may or may not significantly affect the grant eligible capacity and grant funding for the District's project. On the basis of the present record, we have no means of telling what the impact of inclusion of an appropriate industrial reserve capacity might be on grant funding for the District. In fairness to the District, we see no alternative except to require that the Division reevaluate grant eligible capacity of the District's project taking into consideration appropriate industrial reserve capacity.

One other issue remains to be discussed. At the hearing, the District took the position that, even if the Division's digester sizing approaches are appropriate under ordinary circumstances, the District should receive grant funding for the digester sizes which are most "cost effective". In the District's project, one function of the facilities is the production of methane gas. The substance of the District's position is that increase of the digester detention time from 20 days to 30 days will result in significantly greater methane gas production and that in order to increase detention time from 20 days to 30 days the District requires two 65-foot diameter digesters. The

District contends that the increased value of methane gas produced by the larger digesters would make the larger digesters more "cost effective" than the two 53-foot diameter digesters determined by the Division to be grant eligible.

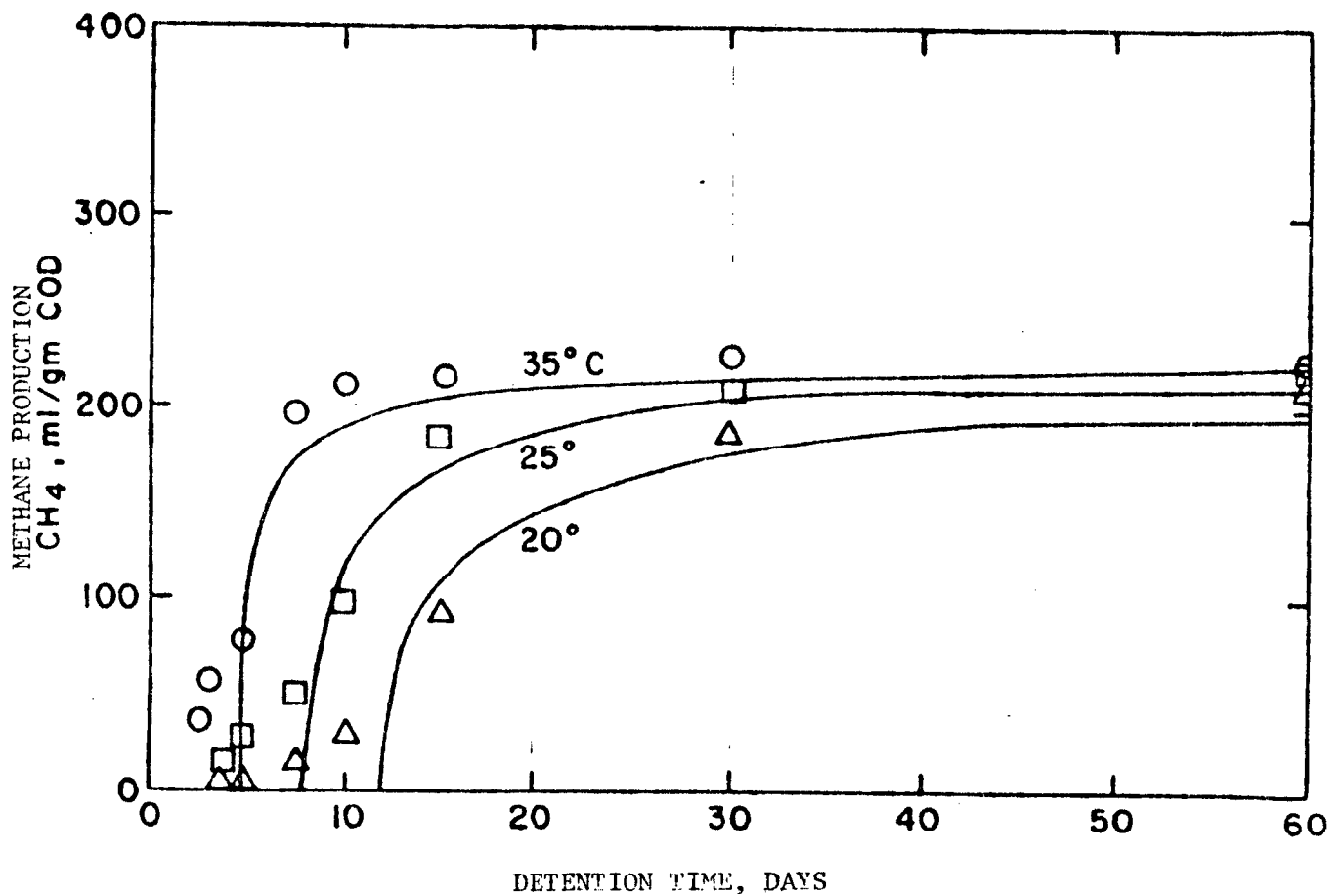
We agree with the general principle propounded by the District. We are committed to funding the most cost effective facilities in each grant funded project.

The problem in this case is that we are not convinced that increase of the digester detention time from 20 days to 30 days will significantly increase the total methane gas production. As a matter of fact, increase of digester detention time from 20 days to 30 days will not significantly increase the total methane gas production. After 15 days detention time, there is no appreciable increase in the methane gas production due to further digester detention at 35°C, the temperature for which the District's digesters are designed. (See attached graphs.)

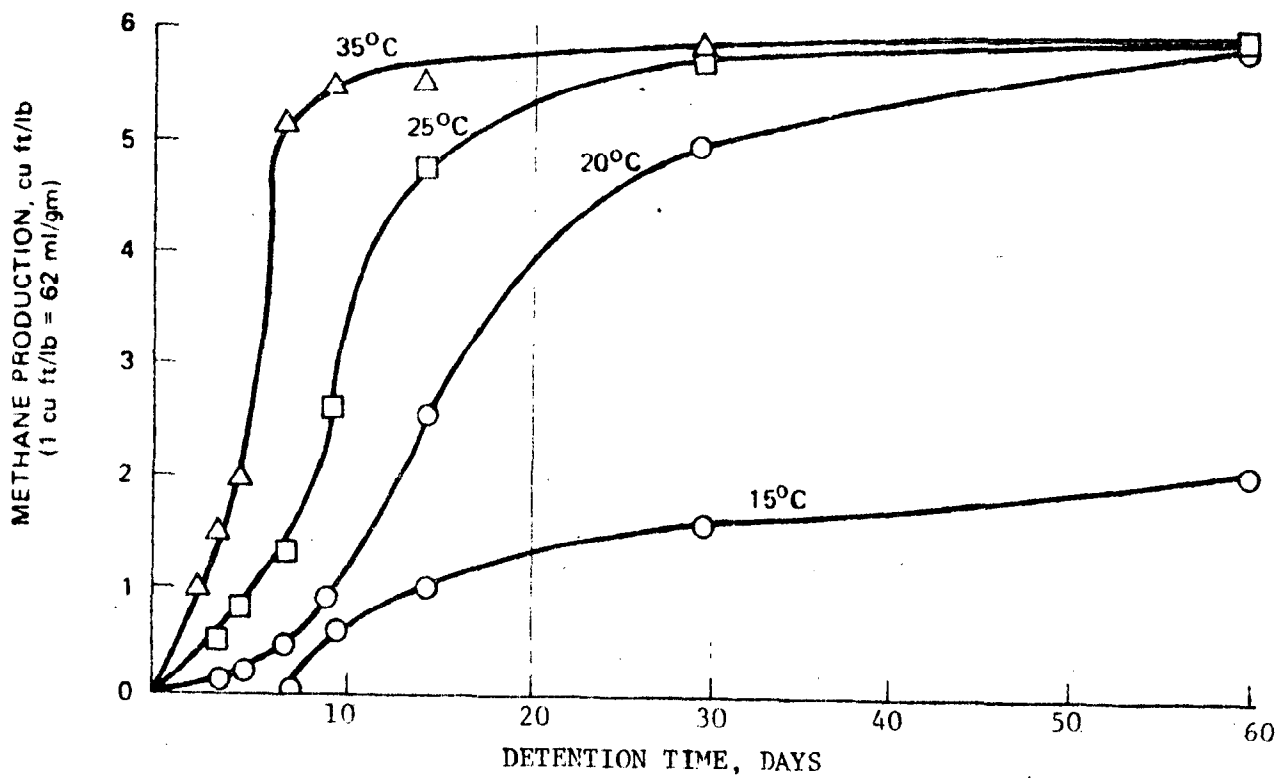
Accordingly, we find that the larger digester sizing proposed by the District is not more cost effective than the digester sizing determined to be grant eligible by the Division due to alleged increase of methane gas production.

V. CONCLUSIONS

Having considered the contentions of the District and the record before us, we conclude as follows:

RELATIONSHIP BETWEEN DIGESTION DETENTION TIMES
AND METHANE PRODUCTION AT VARIOUS DIGESTION TEMPERATURES

From: "Anaerobic Processes"
by Dr. Perry McCarty, Stanford
University. Presented at
International Association of
Water Pollution Research
Birmingham, England, Sept. 18, 1974.

RELATIONSHIP BETWEEN DIGESTION DETENTION TIMES AND
METHANE PRODUCTION AT VARIOUS DIGESTION TEMPERATURES

From: "Process Design Manual for
Sludge Treatment and Disposal"
U.S. EPA, Center for Environ-
mental Research Information,
Technology Transfer
September, 1979 P. 6-22

1. The cost of three portable gas detection units reasonably satisfactory to the District are grant eligible.

2. One portable onsite pump is grant eligible.

3. The suspended solids meter proposed to be installed in the underflow from the dissolved air floatation units is not a reasonable or necessary project cost and is not grant eligible.

4. The Division decision limiting eligible design costs for the treatment plant to the amount derived from use of the ASCE curve, plus actual and reasonable engineering costs for preparation of the operation and maintenance manual, value engineering, redesign of the liquid stream process and special management services, represents the fair and reasonable treatment plant design costs which are grant eligible. The Division decision is appropriate and proper. 18/

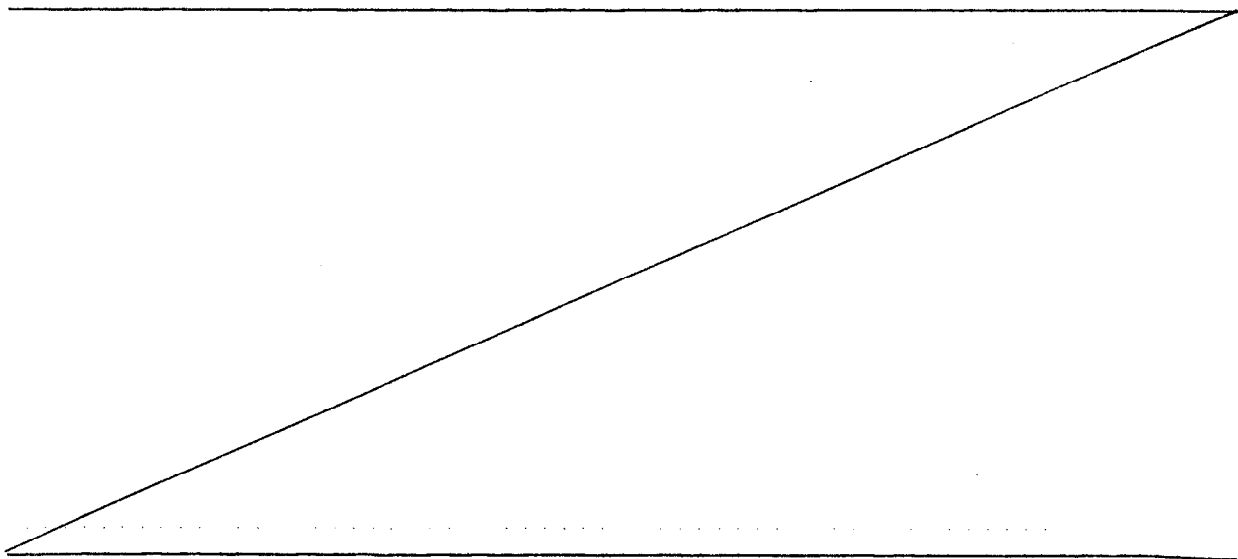
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18. To clarify the effect of this Order, the Order does not fix the exact dollar amount of grant eligible treatment plant design costs. Final eligible amounts will be fixed by final audit. This Order does, however, limit eligible "basic" design costs to an amount not to exceed \$1,283,212. Reasonable, actual Step 2 costs for preparation of the operation and maintenance manual, special project management, redesign of the liquid stream process, and design revisions due to value engineering studies are grant eligible. The costs for these latter services are presently "estimated" at \$60,000, \$110,000, \$4,796, and \$19,410, respectively. Final eligible costs as determined by audit may be more or less than the current estimates, provided that in no event shall eligible cost for special management services exceed 10 percent of the eligible "basic" design costs.

5. The Division's general approach on determination of the grant eligible capacity of the District's project is appropriate and proper. However, grant eligibility of the project must be reevaluated, taking into consideration the appropriate nominal industrial reserve capacity to which the District may be entitled under applicable regulations.

The foregoing conclusions dispose of the issues which are properly before us at this time. To avoid any misunderstanding, we will briefly note two other matters which may affect final grant eligible sizing of the District's project which are not decided by this Order.

First, there was some discussion during the hearing that the sludge handling facilities would be operated only five days a week rather than seven days a week. If this operational mode were in fact followed, it might affect the eligible sizing of the centrifuges and the digesters. The Division advised the District by letter of June 27, 1978, that if a five day/week operation were shown to be the most cost effective mode of operation, the Division would adjust the grant eligibility of centrifuge capacity and additional digester storage volume as appropriate. We do not decide this issue because no final decision by the Division has been requested by the District nor made by the Division. If the District wishes to pursue this issue with the Division and obtain a final decision from the Division, the District is free to do so.

Secondly, as we have previously noted, the sizing eligibility was, in part, founded upon E-0 population projections to 1988, based upon an estimated commencement of construction during 1978. The District has advised us by letter of January 8, 1980, that construction did not commence until May of 1979. The District has requested that the grant eligible sizing of their project be reevaluated based upon E-0 population projections to 1989, 10 years after actual commencement of construction. The Division should evaluate this request and provide this Board with the results of their evaluation together with their recommendation on use of E-0 population projections to 1989 in determining grant eligibility for the District's project. At the same time, the Division should reevaluate total grant eligible capacity, taking into consideration the industrial reserve capacity to which the District may be entitled, and advise us of their findings and recommendation.



VI. ORDER

IT IS HEREBY ORDERED that final grant eligibility of equipment specified herein, the treatment plant design costs, and sludge handling facilities of the District's project shall be determined in accordance with this Order except as may be subsequently ordered by this Board.

Dated: May 15, 1980

WE CONCUR:

/s/ William J. Miller
William J. Miller, Vice Chairman

/s/ Carla M. Bard
Carla M. Bard, Chairwoman

/s/ L. L. Mitchell
L. L. Mitchell, Member

/s/ Jill B. Dunlap
Jill B. Dunlap, Member

/s/ F. K. Aljibury
F. K. Aljibury, Member