Selection of an Independent Consulting Engineer

D. A. BUZZELL
Consulting Engineers Council of the United States
Washington, D. C.

DISCUSSION by Glen H. Abplanalp, Havens and Emerson, Ltd., New York, N. Y. and Cleveland, Ohio

Mr. Buzzell has presented a fine discussion of why and how an independent consulting engineer should be selected by the owner. Although generally directed to the solid waste disposal field, I believe that there are other developments in this area which are, or at least appear to be, unique to the incineration field.

Special Problems of Solid Waste Disposal

Of all the environmental disciplines, the disposal of solid waste has been exposed to a greater variety of solutions, many of which have received unwarranted favorable publicity in the press. In most cases the solid waste disposal problem is handled by a public body or agency. The subject generates its own emotional response among the public. "Informed taxpayers" become experts by reading Government publications, the Reader's Digest, and various feature articles in their local Sunday newspaper. Under these circumstances a public agency requires the advice and expertise of a qualified and objective independent consulting engineer. It can be re-emphasized that such technical advice and expertise will promote fair competition among material and equipment suppliers and contractors to the ultimate benefit of the public. When proposals are received, an intelligent and objective evaluation of all alternatives is possible. For example, there is a wide variation on the part of air pollution control agencies in emission limitations, definitions of pollutants, and test methods and interpretations, and an equally wide variation in claims for gas cleaning efficiency on the part of equipment manufacturers. For this reason alone, it would be grave error for any public agency to proceed without specialized expertise and counsel.

Do Not Tie Engineering Design Fee to Construction Cost

I agree completely with Mr. Buzzell's statement that the engineer should be selected "on the basis of qualifications and availability rather than price". However, I would go one step further and recommend that the design fee be established as a lump sum amount payable in installments during the design period. A schedule of fees which fixes the consultant's compensation based on percentage of the final cost of construction can create in the mind of the public the thought that the engineer may have intentionally inflated the cost of the project in order to increase his own compensation. Surely there is no incentive for the unprincipled engineer to spend any professional time to save his client construction cost. The more construction money he saves his client, the less his fee and the greater his expense. An adequate fixed fee for design would eliminate this unhappy circumstance.

Fees for Alternatives in Design

One further element which creates difficulties for independent consulting engineers is the client's request that he solicit proposals for alternate methods of air pollution control, furnace design, etc. These requests may be in the public interest; however, many consultants have not made appropriate provision in their design contracts to cover such eventualities. The designer must be paid an adequate additional fee for the preparation of plans and specifications necessary to an intelligent solicitation of alternate bids. One method which is relatively easy to understand is to establish fees for such alternates in advance rather than wait until the work has been completed and then confront the client with a sizable additional design fee.
Firm Principals Should Be Qualified in Field

The suggestion was made that the client check references for similar undertakings. Although inferred, Mr. Buzzell did not specifically state that a client should carefully check to determine that the engineering firm under consideration has the specialized talent and expertise among its partners and employees appropriate to the problem. The client should be certain that one or more of the partners or executives of a firm, as well as the firm's key employees, are knowledgeable in the field.

Diversification

It seems that diversification has captured the imagination of our entire economy and this is equally true of the engineering profession. The American is supermarket-oriented, so it is natural for a client to expect his engineering consultant to have proficiency in a broad area of environmental control. Some organizations have employed one expert in the field, thus generating a solid waste disposal department. Other firms, not desiring this type of continuing expense, have retained freelance individuals to serve as their consultants for specific projects. Usually the entire design concept is that of the employed consultant with the engineering firm doing the basic structural design, drafting, etc. These independent "Consultants to Consultants" are, from my experience, knowledgeable and experienced men. However, a client must recognize that if anything should happen to this key individual, the project would in fact suffer a devastating blow. Any agency planning an involved project, such as a major incinerator installation, should give careful consideration to the technical depth and competence of the organization it retains in order to assure the ultimate successful completion of the project.


In his excellent discussion of the considerations in the selection of a consulting engineer, the Author points out that the responsibility of the consulting engineer does not stop with completion of design, but carries on through construction, startup and operation. This is a concept which needs to be emphasized.

In the past it has frequently occurred that a city has an engineering staff or proposes to employ inspectors for construction and discharges the design firm when plans and specifications are accepted. This procedure often produces unsatisfactory results. During construction of a plant involving equipment, there are many occasions when judgement is required. The municipal employee is not familiar with the design, does not have intimate knowledge of the intent of the designer, and cannot be expected to always reach the best conclusion on questions of construction and equipment selection and installation. It is really unfair to place the municipal employee in such a position.

The importance of this question is being recognized by governmental agencies. In wastewater treatment plants it is now required that the designing engineer render construction services, prepare a manual of instruction for operation, place the plant in operation, and train the operators. In any project involving processes as well as structures, such as incinicators and other waste treatment facilities, the finished plant must function as intended, and the designing engineer is best equipped to advise on operation and even provide assistance and advice throughout the life of the installation.

When this procedure is followed, all parties involved in the project gain. The owner not only is likely to get the best facility, but looks to one point for responsibility for results. The governmental agencies also look to one place for responsibility. The construction contractor gains by working with the party most familiar with the project. The supplier of equipment gains for the same reason. Also when attention to equipment operation is needed, the manufacturer can be more certain that it is not for some trivial matter needing only minor adjustment. And finally the engineer gains because the operating experience obtained by his staff is an advantage in design.

With the advancing technology involved in incineration and other processes of waste treatment, and the problems encountered in applying the technology, there is more and more need for both the technical and practical considerations. Incineration must provide the complete combustion of refuse, must control temperatures, must avoid air pollution, and when boilers are used, must guard against corrosion of boiler tubes by the aggressive flue gas. These are relatively new problems which, until recently, had not been recognized. Other waste treatment processes must be carried to a higher degree of abatement with many additional problems involved. It is proper to look to the engineer for the expertise required, not only in design, but to see that the processes and facilities function properly.

With the care in the selection of consulting en-
engineers outlined by Mr. Buzzell and the acceptance by the engineer of complete control and responsibility we can look forward to continued improvement in incineration and other waste disposal projects.

**DISCUSSION** by Carl A. Arenander, Malcolm Pirnie, Inc.

Mr. Buzzell’s presentation of the various aspects to be considered when engineering expertise is required is excellent and little remains for discussion. The procedures he has outlined are those recommended by all the major professional engineering societies. His paper should receive wide distribution to those who contemplate engaging engineering services.

A few points are considered to be of major importance and thereby merit emphasis.

1. It is essential that the services of the engineer be secured in the early phases of the project. Thus he is available to provide advice and guidance in the preliminary discussions. He can assist in formulating the philosophy and concepts to be carried through the project. Frequently, well intentioned but inexperienced handling in the early stages has resulted in discussions that have been unfortunate, and at times, even fatal.

   Generally, engineers are involved in the various stages necessary for the development of a facility. Through these experiences they have learned to recognize some of the pitfalls of site selection, financial and legal procedures, public relations and economic feasibility. He often can detect when assistance in these fields is needed.

   The consulting engineer should be engaged for all of the several stages through which a project must pass to arrive at an operating facility. The background of knowledge and philosophy acquired in the early conceptual planning will form a better basis for understanding with the client during the detailed design period and will carry over into the construction and operational stages. Providing this continuity will avoid many difficulties as responsibilities are defined and are continuous.

2. During the final selection period personal interviews should be conducted with the limited number of firms remaining for ultimate choice. Have them give a presentation before your board or council. This will demonstrate their ability to perform at public meetings. Although this is not strictly engineering and certainly is not a substitute for engineering competence, this phase of an engineer’s talents is becoming of far greater importance in gaining public acceptance of many civic projects.

   The engineer can play an important function by participating in public meetings and presenting the technical aspects of the project in language and in a manner that the taxpayer will understand and accept. The engineering profession is recognizing the importance of this ability. Many firms have developed the use of visual aids, films and slide presentations for this purpose.

3. In conjunction with gaining public acceptance of a project, particularly one involving incineration, it is strongly recommended that a competent public relations consultant be involved from the inception of the project. Unfortunately, many worthy and essential facilities have been delayed and have required tremendous effort to overcome public resistance because of some inept or misapplied public statement. The natural tendency to taxpayer resistance is great enough to surmount without the aggravation that can result from improper public information.

4. One final point which is particularly applicable to municipal incinerator projects — an inordinately long period can elapse from the inception of the project when the need is recognized, until the facility is funded, designed, constructed and is finally ready for operation.

   Several recently completed incinerators have required periods of seven years. Large installations may require 10 or more years before they are ready to function. Local public objection can be a major cause of delay. However, no matter what the cause, delay will result in increased costs. Some recent experiences have demonstrated that delays have caused substantial increases in construction costs. Some have been a large percentage of the original cost estimate.

   So in selecting a consulting engineer, consider first his technical competence for the specific project. Then evaluate the assistance he may provide in complementing the other professional talent available to plan and execute a public information program that will win taxpayers’ acceptance.

**AUTHOR’S CLOSURE**

Presumably most of the audience agreed with my general statements, and all of the prepared comments complimented and supplemented my remarks. An audience reaction of this nature is pleasing to a speaker, but also creates the suspicion that more should have
been said in the interest of constructive debate and criticism.

Mr. Abplanalp suggests that engineering design fees be established on a lump sum basis rather than be related to a percentage of the construction costs. While I agree with him personally, it must also be stated that there are differing opinions within the profession on this point. Many favor the lump sum fee basis, while others feel that the percentage of construction costs method has some merit. The percentage method is at least accepted and recognized, and it also recognizes the fact that the cost of engineering design cannot always be accurately determined in advance.

Two comments from the floor following my presentation were also of interest to me. One participant remarked that many individual consultants and consulting engineering firms offer to provide professional service in fields where they are not truly experienced and qualified. It is true that some firms do attempt to provide services in fields where they lack experience and qualifications in depth: this should be policed by the profession itself through such organizations as CEC, ASME, etc.

A second participant suggested that the successful design and operation of a complex incinerator plant requires more than straight engineering expertise. He noted the importance of providing operating manuals and procedural information, and so forth. Here again, I concur. Consulting engineering firms should equip themselves to provide the complete scope of services.