

INTERNATIONAL LEAD ZINC RESEARCH ORGANIZATIONI. INTRODUCTION

The INTERNATIONAL LEAD ZINC RESEARCH ORGANIZATION associated with the American Zinc Institute, Inc. and the Lead Industries Association, Inc. is sponsored by many of the major producers of pig lead and slab zinc located throughout the free world. Recognizing the need for additional research in our industries, particularly with respect to product research, these companies joined together through the existing American Zinc Institute, Inc. and Lead Industries Association, Inc. where procedures had been established for collecting the funds necessary for such a research activity and where an effective means for bringing the industry's members together had been established. The program, (ILZRO) founded in 1958 as the Expanded Research Program, is supported by assessments on the total production of pig lead and slab zinc of the participating companies regardless of where the resulting metals are sold. Because of the urgent need to develop new uses for lead and zinc as well as to remain competitive in existing markets, the INTERNATIONAL LEAD ZINC RESEARCH ORGANIZATION concentrates on new product development and has excluded from its scope of activities any research on exploration, mining, beneficiation, smelting, and refining.

The participating companies are located throughout the world and for this reason the INTERNATIONAL LEAD ZINC RESEARCH ORGANIZATION is truly an international undertaking and requires the full cooperation of all who participate. By this means the technical capabilities, market knowledge, as well as funds of our member companies are brought together through the INTERNATIONAL LEAD ZINC RESEARCH ORGANIZATION to undertake the necessary research.

In order to get the program under way at the earliest possible moment, it was decided that we would use existing research facilities rather than attempt to build and staff a laboratory facility. For this reason we use every possible research source including such organizations as independent research institutes and foundations, government laboratories, the laboratories of our own participating companies, and colleges and universities. Our basis for selection of a specific source is that laboratory which we believe can most effectively conduct the research we desire, and the awards are based on merit rather than other considerations. As a result, with our research scattered widely across the world, the problems in communications can complicate our program; however, by effectively managing the operation, we believe the problems of distance can be greatly minimized. We have had many notable successes from the participating laboratories, and we recognize them as essential to our continued success.

II. SCOPE OF THE RESEARCH

As mentioned in the preceding paragraphs, our investigations are directed principally toward developing new knowledge about lead and zinc and their compounds as well as developing new uses for these materials. An essential part of the program is to improve existing products so that they can remain competitive or achieve competitive superiority. A significant portion of our Program is in fundamental research to develop new information and with no commercial objectives assigned to these investigations.

In establishing our program initially, our industries reviewed their present position and the competition they faced. The initial phase of the research was therefore concentrated on improving existing products to maintain their competitive position. The second major step was to investigate those areas which offered promise of new markets and to review our materials to determine where the fundamental knowledge of our materials was deficient. These suggestions came to us from within our industry and from outside sources. The major portion of our research program came from ideas generated within the frame-work of our industry. We are more than pleased to review unsolicited proposals for research, but it should be pointed out that the principal planning has come from within our own industries.

Where outside laboratories propose research to us for investigation we recommend strongly a preliminary review of these proposals with us so that unnecessary expense and time required for proposal preparation are avoided if the proposed research has already been done but the information is not generally available. We cannot exist nor conduct our program without the research sources mentioned above. For this reason we are always pleased to meet with their people and discuss potential new areas for investigation.

III. WHERE IS OUR RESEARCH CONDUCTED?

We have used and are using every conceivable source of investigation from private organizations to government laboratories, from our industry laboratories to universities and colleges. As we have mentioned before, the awarding of a contract for research is based principally on merit and the capabilities of the individual laboratory. Research has been undertaken with organizations such as Battelle, Armour, and Arthur D. Little. We have used industry laboratories of our member companies as well as the industrial laboratories of associated companies. We have utilized the outstanding capabilities of government laboratories here and abroad and our fellowships have been awarded to colleges and universities throughout the world. At the present time we have research under way in Holland, England, Canada, Australia, and the United States. We have tried to establish a single procedure for all the participating organizations in order to minimize problems in communication, patents, and other contractual matters.

IV. PROJECT INITIATION

When we have determined that an area is deserving of investigation, the staff of the INTERNATIONAL LEAD ZINC RESEARCH ORGANIZATION together with its industry committees, which will be discussed in following paragraphs, develop a work statement which defines the problem and establishes the scope and objectives of the research investigation. In the area of fundamental research, the definition of the problem is made as broad as possible to give flexibility to the investigator undertaking this research. The more applied the problem becomes, the easier it is to define the problem and delineate the scope of the research. This work statement is submitted to the potential contractor(s) for review and preparation of his research proposal.

As covered in following paragraphs, this proposal is, in many cases, the only contact between the contractor and those who will review and recommend acceptance of the proposal. Therefore, it is contingent upon the contractor to prepare his proposal as carefully as possible and to clearly and concisely state the program which he proposes to undertake. The proposal will be read and reviewed by the entire industry supporting this program, therefore, it is imperative that clarity and completeness be emphasized.

If a problem is to be undertaken where a single contractor is clearly outstanding in the field, then the work statement is submitted only to that single source and his single proposal is reviewed by our industry. On the other hand, where a problem is rather broad in nature and there is no single laboratory so outstanding that a single source can be recommended, then the work statement and invitation to bid is submitted to more than one potential contractor. The proposals are required to be prepared and to be in our hands by a given date for industry review. Once the proposals are in our hands, it may take from one to three months before award of the contract. If no suitable proposals are received, it is obvious that new invitations to bid will be requested. As has been mentioned before, our basis for selection is the capability of the people who will undertake the research, and this is expressed by the program outline and proposal for the investigation to be undertaken.

In preparing the proposal the contractor should provide a detailed outline of the program and method of attack. Where possible a time schedule should be included where a new product or products are to be evaluated to meet specific markets. As defined in the statement of the problem, the procedures for evaluation should be spelled out (i.e. corrosion testing, analytical data, physical property determination, etc).

A. Personnel and Capabilities

Following this a paragraph or paragraphs should be included which list personnel to be assigned to the experimental phase of the project, the supervision which will be provided, the experience and qualifications of professional engineers and/or scientists to be assigned to the work, the man-year effort to be devoted to the project as proposed - broken down as to professional and subprofessional man-years, the experience of your organization as a whole in the field, together with a listing of pertinent publications or research which has been done by your organization in the particular field in question.

B. Facilities and Special Equipment

Where unique facilities or highly specialized equipment are required for the study, an itemization of this equipment together with a statement of the capabilities of your people in operating this equipment is necessary. When purchase of equipment is necessary, the arrangements under which it will be provided must be specified.

C. Subcontractors

A statement is to be included as to whether or not any of the program is to be subcontracted, itemizing the subcontractor(s) to be selected, work he will carry out, and the need for such work outside the prime contractors facilities.

D. Project Expenses

1) Proposal - The proposed bid should also include an itemization of costs broken down as to personnel, special equipment, overhead and materials. It should also advise payment requirements (i.e., monthly, quarterly, or annually). If advance payment is necessary, note should be made of this fact.

2) Payment - All bills should be submitted to the Director of Research of the INTERNATIONAL LEAD ZINC RESEARCH ORGANIZATION for approval for payment.

PROJECT AND PROPOSAL REVIEW AND SCREENING

Regardless of whether the proposal is from a single source or a set of proposals received as a result of an invitation to bid submitted to more than one contractor, these proposals are submitted first to our technical working committees, either for lead or zinc as the case may be. There are three committees which operate in each of these industries.

A Metallurgical Subcommittee has been established which reviews research on mechanical behavior of our materials, physical metallurgy, techniques for producing consumer or industrial products, architectural applications, and the like.

A Chemical Subcommittee reviews all that research which pertains to paints, porcelain, ceramics, organic and inorganic chemicals, and related products.

The Electrochemical Subcommittee monitors those projects which deal with corrosion, power packages (batteries), electroplating and related processes, and cathodic protection.

Based on approval of and a selection of the best proposal submitted by the contractor(s), the project selected by the appropriate technical subcommittee is submitted to the Technical Steering Committee which reviews the selected proposal on the basis of scope, and its place in our over-all program, and provides a second broad technical review of the potential of the project. After approval at the Technical Steering Committee level the selected project is submitted to the Industry Development Committee of the appropriate industry, where it is reviewed for its market potential or the general need for information (fundamental research). After approval at the marketing level it is submitted to the Board of Directors for final approval of the expenditure of funds and for assessment of the participating industry members, so that from a financial standpoint, the research can be undertaken. After receipt of approval at the technical working level, the technical policy level, the sales level, and the management level, the Director of Research will award the contract, as approved, to the selected contractor and at that point the research is initiated.

As the contractor submits reports (to be discussed in subsequent paragraphs) these reports are submitted to the Technical Subcommittees and to the Technical Steering Committee for review and critique of the research results. Our participating members frequently submit suggestions, comments, and recommendations to the Director of Research who in turn passes these comments, plus his own, to the contractor for review. In the event that it is believed that the contractor is not conducting the research with appropriate emphasis and technique, the Director of Research will contact him and arrange for a necessary meeting with the steering committee and the Director of Research to clarify the problems in question. In a manner similar to that described above, the committees at all levels review the research at the completion of the contract to consider renewing the contract and continuing the investigation in subsequent years. The mechanism for review and screening is exactly as covered before.

VI. BUDGET PLANNING

In the fall of each year the various technical subcommittees meet to review the research under way and to either recommend cancellations or

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continuation of the research. At these meetings the committee will also consider new areas of research based on ideas developed by the industry or submitted to the industry from outside sources. While the great majority of the program is developed at this time (starting on or about September 1) new contracts can be initiated any time during the year.

At the budget meetings, those contractors who can readily visit with our committees (the meetings are usually held in New York City) are invited to attend to discuss the research which they have undertaken in the past, their proposals for continuation, or their submission of proposals for new investigations. This personal contact with the working committees permits a full exchange of information and can clarify any matters which are not effectively handled in the normal written reports.

It should also be pointed out that meetings may be held during the year at which time the contractors will be invited to meet with the committees at a central point or it may be arranged to have the technical committees meet with the contractor at his facilities to review the research, meet the personnel undertaking the investigation, and examine samples, processes, etc.

Referring again to the budget meetings, the working technical sub-committees review the entire proposed program and recommend the problems to be investigated and suggest the sums which they feel should be spent to conduct the research in question. Then the proposed budgets of each of the Technical Sub-committees are consolidated and submitted in toto to the Technical Steering Committee of the appropriate industry group (lead or zinc). After a second technical review, they are submitted to the Industry Development Committee where market potentials are considered, and finally to the Board of Directors for final approval and assessment of the participating companies to obtain the funds necessary to support the research in question.

While this may appear to be a complicated procedure, it is actually quite simple and is entirely analogous to the handling of research budgets in individual companies with the single exception that a more thorough and complete review and screening is given our proposed research program than ordinarily occurs in any individual company.

Once the program has been approved and all the individual projects selected, the Research Director will advise the contractor of renewal of his contract or will develop work statements and submit invitations to bid to appropriate contractors for proposal preparation for new projects as covered above.

VII. APPENDIX A - INTERNATIONAL LEAD ZINC RESEARCH ORGANIZATION GENERAL CONTRACT

Attached to this document as "Appendix A" is a sample of the INTERNATIONAL LEAD ZINC RESEARCH ORGANIZATION's general contract. For the most part this contract is to be accepted as submitted; however, in certain cases we will negotiate such changes as may be required to arrive at a mutually satisfactory document. If at all possible, we recommend that potential contractors accept the contract as submitted as it has been developed over a number of years to suit the particular requirements of our industries.

It should be pointed out that all contracts cover only a one-year period, and that they are automatically cancelled at the end of that contract year with or without notice. All contracts are to contain a cancellation clause as covered in the attached document. It should be clearly understood that this contract termination at the end of the contract year is firm, and that no notice need be provided the contractor. If the contract is on a calendar year basis (i.e. from January 1 to December 31 of a given year) he must submit recommendations for renewal of the contract in accordance with our normal budget planning procedure. On the other hand, if the contract has been initiated during the calendar year, and if he recommends continuation of the research effort, then he must submit to the Director of Research of the INTERNATIONAL LEAD ZINC RESEARCH ORGANIZATION such a recommendation for continuation together with a brief outline of the proposed work to be carried out on the subsequent phase of the investigation, and a statement of funds required in a manner similar to submission of the original proposal. The Director of Research will immediately forward the proposed proposal for continuation of the research to the committees for review and screening. If submitted to the Director of Research no later than 90 days prior to termination of the contract, sufficient time will be provided to permit the contractor to continue his work immediately upon completion of the most recent phase of the investigation.

The contractor will note the requirements on patents and publications, contract initiation, termination, extension, cost, and payment clauses. Reference is also made to equipment and to communications with the Director of Research. The contractor's authority for initiation of the contract, for change in scope, for submission of reports, etc. is the Director of Research of the INTERNATIONAL LEAD ZINC RESEARCH ORGANIZATION, and the contractor is to accept instructions from no other source.

With regard to personnel and capabilities, the contractor is obligated to advise the Director of Research of any change or reassignment of personnel conducting the investigation. In the original proposal, the personnel to conduct the research have been listed and therefore any changes to this personnel assignment must be brought to the attention of the Director of Research of the INTERNATIONAL LEAD ZINC RESEARCH ORGANIZATION at once.

The Director of Research of the INTERNATIONAL LEAD ZINC RESEARCH ORGANIZATION reserves the right to review critical research reports prepared by the contractor as well as the fiscal data covering the bills which are submitted to the INTERNATIONAL LEAD ZINC RESEARCH ORGANIZATION for payment. This is to clarify any problems which may arise with regard to payment and/or ultimate patenting of inventions arising out of this research.

VIII. REPORTING PROCEDURE

Attention is also called to the requirements for report submission.

1. At the end of the first three months, 75 copies of a brief letter report, two or three pages, is to be submitted to us. The report should include the highlights of the work undertaken during this period. Critical data covering significant accomplishments should also be included.

2. At the completion of the first six months you should prepare 75 copies of a detailed semi-annual report on the research undertaken during the previous six months. This should be equivalent in detail to the quarterly reports submitted in the past.

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3. At the end of nine months, 75 copies of a second brief letter report covering the third quarter will be submitted as described under paragraph 1.

4. At the end of the contract year, 200 copies of a detailed report are to be submitted on the work conducted during the twelve-month period. This report will be similar to the final reports prepared in the past. It should include the detailed data of the first six months as well as the second six-month period.

5. In addition, we require that you submit summaries covering the work done during each six-month period. These summaries are due on January 31 and July 31 for incorporation in ILZRO's semi-annual publication, the RESEARCH DIGEST. Your summaries should require little or no editing by us and should be no more than three pages in length. Please refer to your copies of the DIGEST for examples of suitable resumes.

None of the research results of the contract in question are to be published or presented at technical meetings unless cleared in advance by the Director of Research of the INTERNATIONAL LEAD ZINC RESEARCH ORGANIZATION. We feel it is our prerogative to have such information released in areas where it can be of greatest benefit to the lead and zinc industries. However, our basic policy is to disseminate the results of our research widely.

IX. INDUSTRY ASSISTANCE

The contractor working with lead and zinc is advised that a tremendous storehouse of knowledge is available within these two industries. Should he encounter problems in such critical areas as metallography, analysis, and the like, the Director of Research should be contacted immediately so that the necessary assistance can be provided the contractor.

This should also apply when sample materials are required or other critical data not available in the contractor's library or background. Because of the outstanding cooperation given by our industries to the INTERNATIONAL LEAD ZINC RESEARCH ORGANIZATION, we can assure you of the wholehearted support of our member companies regardless of their location.

The cooperation between the member companies is outstanding. The contractor will find that his difficulties can in many cases be solved by means of a telephone call or letter detailing the assistance required, and in turn the Director of Research has behind him the technical background and capabilities of these two outstanding industries to assist in every way possible. The contractor will be aided by every means possible through the close working relations of the member companies and the technical committees which screen and review the work in question. In addition, in certain critical areas, we are indeed fortunate to have the cooperation and assistance of related industries who can provide further help and assistance to the contractor. The point of contact in seeking such help is through the Director of Research of the INTERNATIONAL LEAD ZINC RESEARCH ORGANIZATION.

X. LIAISON WITH THE INTERNATIONAL LEAD ZINC RESEARCH ORGANIZATION

As covered in the contract requirements, the contractor is to advise which person or persons in the contractor's organization will maintain contact with him to insure adequate communication as to objectives, changes in scope, acceleration or deceleration of the program. Instructions as to the performance

the contract, and any changes to be carried out by the contractor, are to be given only by the Director of Research of the INTERNATIONAL LEAD ZINC RESEARCH ORGANIZATION and through no other source. This is to insure minimum conflict in conducting the investigation in question. This communication also applies to reassignment of personnel on the part of the contractor as covered in preceding paragraphs. As mentioned above, the Director of Research or the staff of the INTERNATIONAL LEAD ZINC RESEARCH ORGANIZATION will make periodic visits to the contractor's facilities to discuss the program and the progress of the research. It may also be advisable to have the Technical Subcommittees and such other industry representatives as may be designated to visit with the contractor at his facilities or have the contractor's representatives meet with the Director of Research and industry representatives at mutually suitable points. The contractor is urged to maintain close liaison with the Director of Research and his staff to insure minimum conflict and most efficient progress of the research in question.

XI. PATENT POLICY

As covered in our general contract, all inventions relating to the research conducted by the contractor or his technical personnel or sub-contractors, first reduced to practice during the term of this contract or any extension thereof, become the property of the INTERNATIONAL LEAD ZINC RESEARCH ORGANIZATION. This requirement applies whether the inventions are patentable or not and whether or not patent applications are filed on such inventions. This requirement also applies to subcontractors and their employees. The contractor, subcontractor, and their technical personnel shall sign appropriate applications for patents and assignments at the request of the INTERNATIONAL LEAD ZINC RESEARCH ORGANIZATION and shall assist the INTERNATIONAL LEAD ZINC RESEARCH ORGANIZATION in every reasonable way to maintain and enforce patent protection for the INTERNATIONAL LEAD ZINC RESEARCH ORGANIZATION in the United States and in other countries of our choice.

As covered above, the contractor shall delete from appropriate reports submitted for distribution such patent information and crucial data which would seriously affect obtaining patents on the inventions or which would disclose critical know-how of inventions developed. This may be accomplished by exclusion of these data from the normal reports submitted by the contractor and included in a separate confidential report appropriately marked, or by having separate detachable sections of the report marked "confidential". This information must be handled in this manner so that there would be no effective disclosure which would hamper subsequent issuance of patents. Where the contractor takes such action (i.e. preparing a confidential report) the Director of Research should be informed so that he can in turn make appropriate arrangements for disclosing this information to the companies which provide the financial support for this entire program.

By and large patents are obtained to enhance utilization of the results achieved by this program and generally are not to be classified as restrictive unless such restriction would insure ultimate use of the results of our research effort. The declared patent policy of our program is as follows:

The American Zinc Institute, Inc. and Lead Industries Association, Inc. will obtain patents in the United States and foreign countries where warranted by technical considerations or potential commercial usage. In general, the rights to both patented and unpatented inventions owned by the two organizations will be licensed on a non-exclusive, unrestricted basis in such manner as to assure

maximum usage of the invention at the earliest practical date. Reasonable royalties may be charged in appropriate cases.

XII. FELLOWSHIP PROGRAMS

The major portion of the requirements detailed above apply to those contracts which are principally of an applied nature. Many of these requirements do not apply to our fellowship program as we recognize the essential difference between the normal industrial research carried on above as contrasted to assistance to students and academic institutions, particularly those students pursuing advanced degrees. Our principal objective in our fellowship effort is to support graduate research preferably at the Ph.D. Level. Our major requirement is that the research be conducted in lead or zinc depending on the source of funds, that is whether the funds for the fellowship effort are to be supported by the zinc industry or the lead industry. While we may suggest research in a critical area such as in the application of lead in glasses and glazes or in porcelain enamels, we are always happy to consider the suggestions of the faculty and/or the student for a research investigation in our area of interest.

In order that the schools may select the best possible people for our program, we will advise the institution immediately after the first of the year that a fellowship will be awarded to the institution. We would appreciate maximum advertising of the fellowship in appropriate bulletins and upon receipt of advice from the colleges or university funds will be provided the school to support the fellowship in question.

In order that we may continue to receive full support of our industry for this fellowship program, we feel that effective communications must be established between the school and ourselves so that we can advise the industry of the students who are recipients of the fellowship, and the problem to be investigated. We wish to receive once each quarter a simple letter report indicating how the investigation is proceeding. This is not to be construed as the formal quarterly report to be required for industrial-type contracts, but is simply a statement of the results achieved through the student's investigation. Ultimately we wish to obtain copies of the thesis developed through the research sponsored by our program.

We feel this fellowship program is very vital, and we are interested in its growth and continuation. To achieve this, it is obvious that effective communications are the only means whereby we can achieve such continuation and maintain the interest of our industry people.

In turn, through the quarterly report prepared and issued by the INTERNATIONAL LEAD ZINC RESEARCH ORGANIZATION, the school, the department, the supervisor, and the student will receive publicity as each fellowship is announced and the work discussed in our reports.

We strongly urge that members having any questions regarding our program and its continuation feel free to contact the Director of Research of the INTERNATIONAL LEAD ZINC RESEARCH ORGANIZATION to clarify any question. In turn, we are pleased to meet with members of the faculty or the administration of the university or college where necessary. We cannot help unless we know about problems which may arise. Correspondingly, we can only obtain future support

or the program if we are advised as much as possible regarding activity on the programs being undertaken at the universities. We plan to have a member of the INTERNATIONAL LEAD ZINC RESEARCH ORGANIZATION staff to meet with the faculty member concerned and the fellow each year to enhance our working relationship and to insure an effective fellowship program.

July, 1963

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