NATIONAL SCIENCE FOUNDATION
WASHINGTON 25, D.C.

January 3, 1964

Mr. Arthur A. Brennan, Jr.
Contracts Administrator
University of Pennsylvania
Philadelphia 4, Pennsylvania

Dear Mr. Brennan:

We have at the present time copies of the following proposals, for each of which we should appreciate receiving information about the current support and pending applications of the principal investigators and senior professional personnel:

"Study of Remanent Magnetic Measurements", Principal Investigator, Dr. Elizabeth K. Ralph, (P-16433).

"Use of New-or-Recycle Materials in Industrial Processes", Principal Investigator, Dr. Giuseppe M.F. di Roccaferrera, (P-16465).

"Study of Some Problems in Analytic Number Theory", Principal Investigator, Dr. Emil Grosswald, (P-16528).

Sincerely,

Dorothy P. Jones
Statistical Analysis and
Technical Information Unit

Mathematical, Physical and
Engineering Sciences Division

UNIVERSITY INTRAMURAL CORRESPONDENCE

OFFICE OF PROJECT RESEARCH AND GRANTS

TO: Dr. Elizabeth K. Ralph
Dr. Giuseppe M. F. di Roccaferrera
Dr. Emil Grosswald

FROM: Arthur A. Brennan, Jr.

DATE: January 6, 1964

Please find attached a copy of a letter from the National Science Foundation requesting information in connection with your recent proposal. Please forward to this office the information needed to comply with NSF's request.

Arthur A Brennan Jr
Arthur A. Brennan, Jr.
Contracts Administrator

AAB:hl

Attachment

Sent to wrong place in U of P.
" NSF ?
"
"

January 9, 1964

Dr. Arthur A. Brennan, Jr.
Contracts Administrator
Office of Project Research & Grants

Re: NSF Inquiry of 1/6/64 from
Dorothy P. Jones

Dear Dr. Brennan:

As Research Investigator in charge of the Radiocarbon laboratory in the Department of Physics, my salary (Elizabeth K. Ralph) and the salaries of two full-time assistants are paid entirely by the University of Pennsylvania.

The funds received from the University for the support of the Radiocarbon laboratory for the budget year 1963-1964 are as follows:

Salaries	
Elizabeth K. Ralph, Research Associate	$10,400
Robert Stuckenrath, Jr., " Assistant	7,200
John Gruninger " "	5,000
Current Expenses	3,500*
Equipment	2,500
Total	$29,600

*$3,100 of this sum was contributed by the University Museum

It is anticipated that the University will contribute the same amount of funds for the budget year 1964-65.

In addition to these funds, the Radiocarbon laboratory is the recipient of grant NSF-GP-405 entitled "C-14 Measurements of Known Age Samples". The duration of this contract is 9/15/62 to 9/15/64 and the amount is $30,000. Elizabeth K. Ralph is the principal investigator.

Dr. Arthur A. Brennan, Jr. January 9, 1964

Elizabeth K. Ralph (Principal Investigator) submitted proposal P-16433 entitled "Study of Remanent Magnetic Measurements" to the NSF, Division of Geochemistry, on October 28, 1963.

Elizabeth K. Ralph is listed as one of four principal investigators (with Dr. Robert Maddin, Dr. Robert H. Dyson, Dr. Froelich Rainey), all of whose salaries are paid by the University of Pennsylvania, in a grant proposal entitled "Training Program in Metallurgy & Archaeology", which was submitted to the NSF, Division of Engineering on Dec. 2, 1963.

In addition, Elizabeth K. Ralph assists Dr. Froelich Rainey, Principal Investigator, in the work conducted under the sponsorship of grant NSF-GS-294 entitled "Applied Science Center for Archaeology". The duration of this contract is 9/1/63 to 8/31/64 and the amount is $25,300.

Sincerely yours,

Elizabeth K. Ralph
Dept. of Physics

EKR:ek

NATIONAL SCIENCE FOUNDATION

WASHINGTON, D.C. 20550

May 22, 1964

Dr. James L. Malone
Contracts Administrator
Office of Project Research and Grants
University of Pennsylvania
Philadelphia 4, Pennsylvania

Dear Dr. Malone:

The National Science Foundation requires that each proposal submitted for the support of research includes a summary of all of the current research support and pending applications of principal investigators and, where appropriate, of other senior research personnel planning to participate in the research. Information which must be included in this summary is detailed on page 15 of the enclosed December 1963 amended edition of the guide for the submission of research proposals, GRANTS FOR SCIENTIFIC RESEARCH.

May we request this information for all pending proposals other than those referenced below, and all current support other than NSF GP-405 (Ralph), for each of the following:

"C-14 Measurements of Known Age Samples", Principal Investigator, Dr. Elizabeth K. Ralph, (P-18671).

"Research on Neighbor Listing", Principal Investigator, Dr. Harry J. Gray, (P-18711).

"Stress Waves in Elastic Rods and Plates", Principal Investigator, Dr. John J. McCoy, (P-18718).

Sincerely,

Dorothy P. Jones
Statistical Analysis and
Technical Information Unit

Mathematical, Physical and
Engineering Sciences Division

UNIVERSITY INTRAMURAL CORRESPONDENCE

OFFICE OF PROJECT RESEARCH AND GRANTS

TO: Dr. Elizabeth K. Ralph
Mr. Charles Dur
Mr. Rex Downie

FROM: James L. Malone

DATE: 6/19/64

SUBJECT: NSF Proposals as follows:
"C-14 Measurements of Known Age Samples"
"Research on Neighbor Listing"
"Stress Waves in Elastic Rods and Plates"

Enclosed for each addressee is a photocopy of NSF's letter of May 22, 1964, requesting information on current research support and pending applications of Principal Investigators. The applicable paragraph on page 15 of the NSF booklet reads as follows:

> "The proposal must summarize all of the current research support of the principal investigator(s) and, where appropriate, of other senior research personnel planning to participate in the research. This information should include the titles and dates of current grants or contracts, the sources of funds, and the annual budgets. A statement must also be made as to whether or not any proposals (including the proposal being submitted to the Foundation) are being considered by, or will be submitted to, other possible sponsors.
>
> The concurrent submission of a proposal to other organizations will not prejudice its review by the Foundation."

Please supply the necessary information for the project of concern to you to OPR&G so that we can comply with NSF's request.

James L. Malone
Contracts Administrator

JLM:msg
Encl.

UNIVERSITY of PENNSYLVANIA
PHILADELPHIA 19104

OFFICE OF PROJECT RESEARCH AND GRANTS

June 30, 1964

National Science Foundation
Washington 25, D. C.

Attention: Dorothy P. Jones
Statistical Analysis and
Technical Information Unit

Mathematical, Physical and
Engineering Sciences Division

Re: Proposal P-18671 Dr. Elizabeth Ralph
"C-14 Measurements of Known Age Samples"

Gentlemen:

In reply to your letter of May 22, 1964, we are pleased to submit a photocopy of Dr. Elizabeth Ralph's letter of June 23, 1964, which would seem to supply all of the information needed by NSF.

Should you, however, have need for any further information, please let us know.

Yours very truly,

James L. Malone
Contracts Administrator

JLM:msg
Encl.

cc: Dr. Ralph

NATIONAL SCIENCE FOUNDATION

WASHINGTON, D.C. 20550

February 12, 1965

Miss Elizabeth K. Ralph
University of Pennsylvania
Philadelphia, Pennsylvania

Dear Miss Ralph:

The enclosed research proposal has been submitted to the National Science Foundation for consideration. Your comments and rating of this proposal will be appreciated and will aid us in arriving at a decision concerning its possible support.

It would be especially helpful if you could comment on the scientific merit of this proposal, whether the proposed work duplicates other research now in progress, competence and potential growth of the principal investigator, facilities available to carry out the planned research, and propriety of the proposed budget. We hope you will include any additional comments which you believe will contribute to a better evaluation of this proposal. Your comments will, of course, be held confidential.

For your convenience a rating sheet and franked envelope for the return of the proposal and your evaluation are enclosed. Your early reply would be appreciated.

Sincerely yours,

Alvin Van Valkenburg

Alvin Van Valkenburg
Program Director
for Geochemistry
Earth Sciences Section

Enclosures

Applied Science Center for Archaeology

THE UNIVERSITY MUSEUM • UNIVERSITY OF PENNSYLVANIA
33rd & SPRUCE STREETS • PHILADELPHIA 4, PENNSYLVANIA
Froelich Rainey, Director EVergreen 6-7400 (Area code 215)
Elizabeth K. Ralph, Associate Director
EVergreen 6-0100 Ext. 8168 (Area code 215)
Cable Address "Antique"

July 2, 1965

NSF

ASEA

Dear Fro,

I've exhausted the Physics office force in getting this typed this afternoon, so please excuse the scribble. Wanted to get this off before the long weekend with the hope that there will be action next week.

All of the enclosed is in response to questions & criticisms posed by Aborn over the telephone. I hope that I haven't made too many mistakes. Aborn hinted that our request may be too big for his branch. If so, we'll have to write individual proposals again. However, there is still hope for a comprehensive grant, with a limit of $75,000.

In an effort to find instrument work for Henry Borstling, I called John Witthoft (State Museum, Harrisburg). He has 3 excavations going with "Poverty Program" labor & is glad to have Henry & instruments in July. What's more he's sending us a contract with $500 for the work. Therefore, instruments will be busy all summer. Mr. Beer has already taken one Geohm & the non-functioning Gradiometer (he hopes to make it work) & will collect the proton magnetometer for use in Peru when we finish in S. Carolina. We had a "lesson" in Fairmont Park the other day.

I now seem to have writers cramp.

Hope all goes well with you.

Best regards,

Beth

July 2, 1965

Dr. Murray Aborn
Program Director for Special Projects
Social Sciences Division
National Science Foundation
Washington, D. C. 20550

Dear Dr. Aborn:

This is my attempt to answer the questions and criticisms in regard to NSF support of ASCA which you were kind enough to mention in our telephone conversation yesterday. First of all - the budget:

1. BUDGET

I have included a summary of costs of all projects contemplated for the first year and itemized lists for each particular program. I have tried to be as specific as possible and to reduce each to a minimum. Inspite of this, the total figure is about $100,000 per year. If $75,000 is the maximum to be considered, I suggest that you decide which item (or items) are least appropriate for this comprehensive grant request and delete them accordingly. Needless to say, the projects that are well underway and are not far from successful achievements, we should like to continue if financially possible. These include the adaptation of the Varian Associates rubidium magnetometer, thermoluminescent dating, the information center (including Newsletter), and underwater archaeology.

For the 2nd and 3rd years, we anticipate the following minor changes:

Exploration Equipment

In either the 2nd or 3rd year, the $15,000 would be applied to the purchase of the improved rubidium magnetometer. If achieved in the 2nd, this money would be available for experimentation and development of an improved metal detector or investigation or purchase of a new type of instrument suitable for archaeological prospecting of which we are not now aware.

Funds of the order of $2500 would continue to be needed for improvement and experimentation with minor apparatus.

Thermoluminescent Dating

It is hoped that enough success will be achieved so that equipment costs could be reduced sufficiently to permit the employment of a student assistant to accellerate the dating of potsherds. It not, the development work would be continued.

Basic budget requests are expected to remain the same for Information and Training, Analyses and Conservation, Underwater Archaeology, and Staff Additions except for small salary increases for the Personnel.

In regard to the important problem - namely, that $75,000 to $100,000 per year is considered too much, my thoughts (and I'm sure that Dr. Rainey will agree) are that we should prefer to continue to request smaller grants for specific projects rather than receive nothing at all. In that event, we would continue, however, with this same feeling of frustration about getting the program "off the ground" or "grounded". Without funds on a continuing basis for adequate staff members and their requisite supplies, we should have to continue with this hodge-podge of activities without developing the more complete center that we hope to achieve - that is, a center of research that can cope with the known problems of archaeological research (without overlapping existing conservation facilities, etc.) as well as one which has the initiative and capability to tackle problems not yet solved.

2. FUTURE

This leads to the problem of future support. Frankly, we hope to become efficient enough so that we could continue to apply to the NSF for basic support. For specific additional projects, we expect, as at present, to obtain funds from private individuals, other foundations, other branches of the NSF, and from industry.

For specific services, we expect the costs to be borne more and more by the expeditions to which they are applied. This growth will parallel the increasing utility of our work. As examples, for instrument surveys, we have had contracts (and financial support) from the Canadian Government and just recently, from the State of Pennsylvania.

The costs of the instrument survey work this Spring (except for overseas travel) were supported almost entirely by expedition funds at Gordian, Turkey and at Artena, Sele, and Sybaris, Italy.

As the teaching and training phases of our program grow, we anticipate a greater share of University participation in the form of faculty salaries, or, at least, the contribution of faculty time.

3. NEWSLETTER COSTS

In regard to the cost of the "expensive looking" Newsletter, I was surprised to find how little the first issue cost. The exact figures are as follows:

4000 Envelopes with ASCA letterhead
1500 Newsletter copies $231.00

(The extra 2500 envelopes are for future issues).

This work was done by the Printing and Duplicating Department at the University of Pennsylvania. Address stickers were made from Thermofax masters - cost $2.00. The Newsletters were (and will continue to be) put in envelopes and the addresses attached by Museum guards who are glad to have something to do while they watch doors - no charge. As it happened, the Museum paid the postage, but may not continue to do so in the future.

We chose to put the Newsletters in envelopes rather than put address stickers on directly because the latter would require part of a page to be blank and in the case of the first issue, would have curtailed the amount of information or required the extra expense of 4 other pages.

In summary, total cost per issue (1500 copies), including postage domestic and overseas, is about $250.

3. REPLY TO CRITICISMS

I can easily understand why one gets the impression that we have and may continue to spend money on projects that may never materialize. I think that this is due mostly to the fact that in every grant, proposal and report for ASCA as a whole, we have discussed the development of a SONIC apparatus for archaeological prospecting.

This has been our major "risk" project and we have not made it clear that this work has been supported almost entirely by industries and private donors with industrial connections who felt that it had enough importance (because of other applications) and enough possibility of success to be supported.

The initial feasibility experiments were made in collaboration with Texas Instruments Co. in Texas and for these as well as subsequent travel to Texas for other tests, travel funds were used from NSF grants to and from Texas. The next stage of experiments was conducted by the Petty Laboratories, San Antonio, Texas, financed by $32,000 contributed by industrial sources. The most recent stage has been done in collaboration with Texas Instruments and has been financed mostly by grants totalling $10,000, also from industrial sources.

I do not have the exact figures because the Museum's accountant is on vacation, but my guess is that, toward this sonic project over the years, the NSF has contributed $5000 whereas $42,000 has come from industrial sources.

As you know, it has not materialized and is in the doldrums now because the "inventor" who is making the next requisite piece of apparatus - a high speed, higher frequency, 4-channel recorder - has not succeeded in making it work. His deadline for completion of this is Sept. 1, 1965. If achieved, it will be tested in Texas and if successful, there is the hope of more support from Texas Instruments. If not, the project will be terminated.

Even though we have not yet achieved and may not achieve an instrument suitable for archaeological prospecting, it has been gratifying to learn that we have obtained some information and made some advances beyond standard seismic techniques. For example, when I attended a NATO sponsored conference on paleomagnetism (and archaeomagnetism) in Newcastle, England, in April, 1964, I talked to geophysicists from all over the world, many of whom had worked with and developed seismic instruments. Several mentioned that if they had stayed in that field they would have experimented with "this and that" at higher frequencies - exactly what we have done.

4. INFORMATION CENTER

I forgot to reply to this question in the Newsletter section. We envision this center as a source of information and reference to archaeologists, anthropologists, other scientists, and students in these fields. Since each one individually is unable to keep abreast of corollary developments and related advances, the aim is to have this information readily available in the center. Also, if one wishes to tackle a new subject, the card files provide ready clues to publications.

It is being used regularly now by staff members, students, and visitors to the Museum as well as providing many answers to questions received by mail.

I hope that I have managed to answer most of the questions and criticisms without creating too many new ones. I am sending a copy to Dr. Rainey in Alaska in case he wants to review statements or omissions.

I shall look forward to hearing from you and will be glad to write more or appear in person if needed. In the meantime, we shall prepare our thermoluminescent dating proposal in tentative form so that it may either be included in the comprehensive proposal or submitted separately.

Sincerely yours,

Elizabeth K. Ralph

EKR/LM/DEH

NATIONAL SCIENCE FOUNDATION

WASHINGTON, D.C. 20550

July 13, 1965

Dr. Elizabeth K. Ralph
Associate Director
Applied Science Center for Archaeology
The University Museum
University of Pennsylvania
Philadelphia 4, Pennsylvania

Dear Dr. Ralph:

Dr. Allan Smith and I have reviewed your letter of July 2 in great detail, and now feel in a position to proffer a clear judgment as to the chances of Foundation support for the ASCA proposal originally outlined in Dr. Rainey's letter of May 13.

I know this will come as a disappointment to you, but our reactions are predominantly negative. While your July 2 letter addresses itself to the outstanding questions and criticisms which I brought to your attention during our telephone discussion the preceding day, it does not by any means resolve them. It adds to our understanding of the ways in which the funds requested would be used, but it amplifies the essentially open-ended character of ASCA's needs and the high cost of its operations to prove out devices that are either tangential to this Division's programmatic interests or simply beyond the financial reach of most academic archaeologists.

I should be happy to enter into further discussions with you regarding the specifics of the above, but I am responding to your letter in this general way in the interests of those immediate decisions you must make regarding the submission of individual project proposals both to this Division's regular Anthropology Program and perhaps to the programs of the Earth Sciences Section of the Division of Mathematical and Physical Sciences.

In our judgment, ASCA would do better by continuing to seek Foundation support as it has in the past--on a project-by-project basis. While the submission of a Special Projects proposal would not necessarily conflict with that tactic, we have serious doubts about its potential for success in a highly competitive situation.

Sincerely,

Murray Aborn

Murray Aborn
Program Director for
Special Projects (Social Sciences)

July 29, 1965

Dr. Allan Smith, Program Director
Division of Social Sciences
National Science Foundation
Washington, D. C. 20550

Dear Dr. Smith:

With the hope that we may continue the present projects of ASCA, we have prepared three grant proposals. They are as follows:

1) Continuation of Dating Pottery by Thermoluminescence.
2) Development of Rubidium (or Alkali Vapor) Magnetometer for Archaeological Prospecting.
3) Information Center and Training.

These are being processed by our Office of Project Research and Grants, and will be sent to you in the near future. As Dr. Kidder mentioned on the telephone, they are listed in our order of preference and possibly also of suitability of support in your division.

Sincerely yours,

Elizabeth K. Ralph

EKR/deh

July 29, 1965

Mr. Arthur A. Brennan, Jr.
Project Research and Grants
3400 Walnut Street

Dear Mr. Brennan:

Twenty-one copies of three grant proposals accompany this letter. They are as follows:

1) Continuation of Dating Pottery by Thermoluminescence.

2) Development of Rubidium (or Alkali Vapor) Magnetometer for Archaeological Prospecting.

3) Information Center and Training.

We shall appreciate it if these can be sent to Dr. Allan Smith, Program Director, Division of Social Sciences, National Science Foundation.

Sincerely yours,

Elizabeth K. Ralph

EKR/deh

Encl.

NATIONAL SCIENCE FOUNDATION
WASHINGTON, D.C. 20550

August 12, 1965

Dr. Froelich Rainey
University Museum
University of Pennsylvania
Philadelphia 4, Pennsylvania

Dear Dr. Rainey:

Your proposals for support of the research named below have been received by the Division of Social Sciences and assigned to the Anthropology Program for study and evaluation.

They will be reviewed by our Advisory Panel at its next meeting. Processing normally requires three to six months from the time of receipt. You will be advised as early as possible regarding the Foundation's ability to support your work.

Sincerely yours,

Richard W. Lieban

Richard W. Lieban
Program Director for
Anthropology

"Continuation of Dating Pottery by Thermoluminescence."

"Development of Rubidium (or Alkali Vapor) Magnetometer for Archaeological Prospecting."

"Information Center and Training."

Beth — Please return Dir Off.
Techniques

NATIONAL SCIENCE FOUNDATION
WASHINGTON, D.C. 20550

December 8, 1965

Dr. Froelich Rainey
University Museum
University of Pennsylvania
Philadelphia, Pennsylvania 19104

Dear Dr. Rainey:

In our review of your proposal for support of a "Continuation of Dating Pottery by Thermoluminescence," questions were raised with regard to your group's awareness of the advances being made by physical scientists in this field and, in particular, of Dr. Aitken's work at Oxford. Our referee felt that your group was not profitting as much or as quickly as it might from the work of Aitken and others. For example, on page 7 of the proposal you mention the discovery that the low temperature peak or peaks in the x-ray generated glow curves are unstable. According to our referee this is discussed at some length by Aitken, Tite, and Reid in their work cited as reference 4 in the proposal. Furthermore, the referee asks why after its discovery of this effect, your group still apparently relies on a week or two waiting period after x-ray exposure, instead of getting rid of the low-temperature peaks promptly by post-exposure heating for a few minutes at, say, 150°C.

Our physicist reviewers felt that your project would be much strengthened by informal collaboration with those engaged in more basic research in physics on your own campus.

At this juncture of our review process, it would be very helpful to us if we could have your comments on these questions. The title page of the official copy does not bear your signature so, as in the case of your other proposal, we need a brief note indicating your concurrence.

Sincerely,

Richard W. Lieban

Richard W. Lieban
Program Director for
Anthropology

UNIVERSITY of PENNSYLVANIA
PHILADELPHIA 19104

OFFICE OF PROJECT RESEARCH AND GRANTS

November 14, 1966

Dr. Richard W. Lieban
Program Director for Anthropology
National Science Foundation
Washington, D. C. 20550

Dear Dr. Lieban:

Enclosed herewith is a letter to you from Dr. Froelich Rainey, Director of the University Museum together with his proposal for support of a research project entitled "Thermoluminescent Dating of Pottery."

The proposal has been approved by appropriate University officials and signed on behalf of the University by Dr. David R. Goddard, Provost.

Should any further information be required, please do not hesitate to communicate with us.

Very truly yours,

Arthur A. Brennan, Jr.
Senior Contracts Administrator

AAB:hc
Encls.
cc: Dr. Froelich Rainey
Dean Otto Springer

ASCA BUDGET EXPLANATION
3/3/64

The ~~two~~ present projects for which financial support is sought are outlined ~~for~~ under "Equipment". During the past three years manufactured instruments designed for archaeological prospecting — the Oxford Proton Magnetometer, the Gossen Geohm, and others, small ones, have been purchased. Our experiments are, therefore, directed toward filling the "gap" in underground detection, that is to serve in the detection of features & objects that are not readily located with existing instruments. Since most major efforts in the past have been ~~previously~~ devoted to geophysical rather than archaeological prospecting, this gap is large. Our first major project (not yet completed) has been ~~directed toward~~ the development of a workable sonic device, that is, an instrument which detects frequencies higher than the geophysical seismic ones ~~with~~ & consequently, because of the shorter wavelengths, will "see" the smaller archaeological features at the comparatively shallow depths.

There is a need also for a variety of specialized instruments such as

improved metal detectors. ~~For~~ Also, it may be that a combination of two techniques such as the monitoring of telluric waves, both natural & artificial, & changes in magnetic intensity simultaneously may provide a new means of detection of certain features.

The technique of dating pottery by thermoluminescence, if proved to be workable, will be an invaluable aid in the dating of many archaeological sites, especially ones at which no carbon is associated with the potsherds. With equipment borrowed from the Dept. of Physics, ~~U of G~~, experiments have progressed ~~to the stage w~~ sufficiently so that it will soon be known if age correspondence may be obtained with this technique.

The small information center in ASCA, for which funds for books & periodicals & a part-time research assistant, are requested, is becoming more useful to students, faculty, & visiting scholars as more ~~material~~ references & ~~subject~~ articles are compiled,

In regard to the other salaries requested, the main task of physicist is the development of thermoluminescent dating with the possible addition of instrument field trips & testing. The second research assistant should be a graduate student in physics or engineering to assist with instrument surveys & tests. The student assistants (ones studying anthropology are usually available) are helpful with various minor projects & with instrument surveys.

Prof. J. Peters
Mrs. M. Lalevic } Drexel

Spectrographic Analysis:- A study of trace elements present in a given object. (Qualitatively)

I. Finished before Feb. 1963
1. Gold Objects. - S. Am. Russia Medit.
2. Copper Covered Metal (Silver) from Dr. Kidder
3. Gibeon Scarab Dr. Pritchard

II. Present in Progress:-
1. Copper Ingots G. Bass
2. Copper - Tin alloy "
3. Ambers from Denmark to be compared with Baltic ambers.

III Further study by Spectrography:-
1. Amber Samples from South America will be analyzed and a comparative study among the samples will be carried out.
2. Amber Samples from other locations in Europe as well as the East (Middle East & South East Asia) are needed for analysis inorder to give a meaningful result to the study.

U. V. Study for plaster.

7/2/65

ASCA BUDGET - One Year

Applied Science Center for Archaeology
University Museum, University of Pennsylvania

(See itemized individual budgets)

Exploration Equipment and Associated Costs	$20,000.
Thermoluminescent Dating	14,170
Information Center and Training	10,943
Analyses and Conservation	3,180
Underwater Archaeology	20,000
Staff Additions	15,800
Total - direct costs	84,093
Univ. of Penna. overhead (20%)	16,819
Total, 1 year	$100,912
Total, 3 years	$300,000

Exploration Equipment and Associated Costs

Development of new rubidium magnetometer, specifically designed for archaeological prospecting.	$15,000
Experiments with other electronic equipment such as battery-powered millivoltmeters and amplifiers for monitoring ground currents in connection with magnetic surveys	$ 2,500
Travel, for ASCA physicist and Varian engineer to test sites in southwestern United States and Europe. (Living costs, etc. at expedition sites are supported by Museum funds)	$ 2,500
Total, direct costs	$20,000

After the preliminary tests of the Varian rubidium magnetometer in the Fall, 1964, Varian Associates has undertaken the design of a completely new detection apparatus. The cost of this stage of development is $30,000. Half of this cost has been borneby Varian Associates and the other half has come from Museum funds. This does not include the purchase price of the instrument because, by mutual agreement with Varian, we plan to rent the instrument until by testing and revising, we arrive at a final improved apparatus that will be optimum for archaeological work. There is no question of the suitability of the instrument - only of the best design for this type of small scale prospecting and the need for portability.

The rental for the first year will be $10,000. We are, therefore, asking for $15,000 to cover this expense with the additional $5,000 to be applied to the cost of subsequent manufacturing changes.

Thermoluminescent Dating

Salary		
Research Chemist (12 months)	$8,000	
Employee Benefits (9.0% of salaries)	$ 720	
Equipment		
Replacement of obsolete components borrowed from Radiocarbon Laboratory		
High Voltage Supply	$1,200	
D. C. Amplifier	$ 750	
Scaler	$ 650	
Expendable supplies and materials	$2,000	
		$4700
Travel - conferences, other research centers		$ 750
Total - direct costs	$14,170	

Information Center and Training*

Salaries		
Research Assistant, full-time	$6,000	
Student Assistant, part-time	$2,400	
Total salaries		$8,400
Employee benefits (9% of salaries)		$ 756
Equipment and Supplies		
Books and periodicals	$ 500	
Office supplies	$ 100	
Duplicating costs - xerox, etc.	$ 100	
Printing costs (ASCA Newsletter	$ 387	
2 issues per year, 1500 copies each)		
Postage (including ASCA Newsletter)	$ 100	
Folding, etc. is done free of charge		
by Museum employees		
Total, equipment and supplies		$1,187
Travel - conferences, museums, and other research centers		$ 600
Total, direct costs		$10,943

*A course entitled "Problems in Archaeology" which includes lectures and field work with instruments and other techniques is offered by B. Wailes, Assistant Professor of Anthropology. This is supported by the Department of Anthropology.

Analyses & Conservation

Salary of part-time visiting Scientist or conservationist	$ 2000
Employee benefits (9%)	180
Total salaries	2180
Minor equipment & supplies, & costs of analyses at other institutions	1000
Total direct costs	$ 3180

This program is envisaged as a beginning in these fields at minimum expense. We plan to invite various specialists, one each year for a period of one term to lecture and conduct practical laboratory sessions in a particular field such as the cleaning and conservation of bronzes, of pottery, etc. It is hoped that there will be a resultant nucleus of trained staff members and students who will be able to continue these vital museum functions. Due to the present lack of major analytical instruments, many requests for analyses from museum curators will continue to be sent out to commercial laboratories and other institutions.

Underwater Archaeology

Improvements & additions to the 2-man submarine	$ 3000
Improvements & costs of underwater mapping techniques	3000
Underwater television cameras	2000
Maintenance of expedition including transportation	12000
Total, direct costs	20,000

This is a minimum maintenance and improvement budget for underwater archaeology. It is included with the ASCA program because of the close relationship of the two projects. Since many of the instruments and techniques of the two groups are basically the same, we feel that greater efficiency will be achieved by a sharing of personnel and facilities. As described under "Staff Additions", the proposed physicist and technician would assist both. The analytical and conservational program will be directed toward both as it has been in the past in a very limited way. The sharing of magnetometers and other instruments (with special sensors for underwater) will help to reduce costs.

Staff Additions

Physicist, full-time	$ 8500
Electronics technician, full-time	6000
	14500
Employee benefits (9%)	1300
Total	15,800

Since its beginning in 1961, all of the activities of ASCA have been conducted with the addition of only one scientist and one research assistant to the staff of the museum. (These positions have been supported by the NSF and are presently held by Mark Han, thermoluminescence, and Jeannette Flann, information center). Much of the work, including field surveys, has therefore been done by Froelich Rainey, the Director (also Director of the University Museum), and by the Associate Director, Elizabeth Ralph (also in charge of the Carbon-14 laboratory), both of whose salaries are paid by the University. Some of the field surveys have been assisted by students when expedition funds have been available.

We are now reaching the state, however, when our requests for field surveys and other services are exceeding the capabilities of our limited personnel. This is also true for George Bass and his colleagues in underwater archaeology. Therefore, there is an urgent need for a young physicist to assist in the work and development for both groups and for a technician for the building, repair, and maintenance of the equipment.

It is anticipated also that the physicist would have time to investigate the possibilities of new techniques and apparatus appropriate for archaeological research, both on land and underwater.