

September 6th, 1974

Mr. Anthony Merritt

Mr. Reagan A. Scurlock, Director  
Office of Research Administration  
Franklin Building E/6

Dear Mr. Scurlock,

Twenty copies of our grant proposal entitled "Museum Applied  
Science Center for Archaeology" for 1975 and 1976 are attached.

We shall appreciate it if you will send the appropriate copies  
to Dr. Murray Aborn, Program Director for Special Projects,  
National Science Foundation.

Sincerely yours,

Elizabeth K. Ralph

NATIONAL SCIENCE FOUNDATION

WASHINGTON, D.C. 20550

October 8, 1974

*Send to B-ette  
Ralph at c-14 lab  
for reply on Monday  
7972*

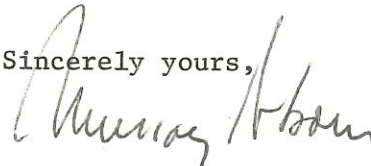
Dr. Froelich Rainey  
University Museum  
University of Pennsylvania  
Philadelphia, Pennsylvania 19104

Dear Dr. Rainey:

The proposal indicated below has been received by the Division of Social Sciences and assigned to the Special Projects Program.

Processing requires anywhere from three to six months from time of receipt, depending upon the scope and complexity of the proposal as well as on other factors. In any event, you will be notified as early as possible regarding the Foundation's ability to support your project.

Sincerely yours,



Murray Aborn  
Program Director for  
Special Projects

SOC-7504203

Enclosure

October 15th, 1974

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

Dear Dr. Aborn,

Fro Rainey has asked me to prepare the enclosed statement in regard to Current Support and Pending Applications in connection with our proposal SOC-7504203.

If I have omitted some vital information, please do not hesitate to let us know.

Sincerely yours,

Elizabeth K. Ralph

# UNIVERSITY of PENNSYLVANIA

PHILADELPHIA 19174

The College

February 6, 1975

DEPARTMENT OF PHYSICS

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

Dear Dr. Aborn:

Thank you for your telephone call and for your advice in regard to the revision of the budget for the MASCA grant proposal. Five copies are being mailed to you as well as a revised cover page.

In regard to specific requests our answers are as follows:

- 1) Froelich Rainey will resume his Directorship of MASCA.
- 2) William E. Stephens, Professor of Physics, has gladly agreed to become an Associate Director of MASCA to guide us in our research. (Incidentally, he has been my advisor and mentor since I first came to U. of Pa. in 1949, and I have the greatest respect for him as a person as well as for his ability.)

Also, at the start of the spring term (January 2, 1975), Jeffrey Klein, an intelligent and capable graduate student in Physics, joined our group. With his know-how in electronics and Physics in general, he will be a good one to work jointly with Bill Stephens in conducting experiments.

- 3) We have listed Dr. Haas as Associate Director for Development. He will be instrumental in obtaining support for MASCA in the future.
- 4) We have instructed everyone and written notes to ourselves in every laboratory to be sure to acknowledge the NSF (with proper division and grant number) in all of our publications.

We apologize for being remiss in this respect, and promise to do our best so that this will not occur again.

Sincerely yours,

Elizabeth K. Ralph

ER/ct

UNIVERSITY OF PENNSYLVANIA  
PHILADELPHIA, PENNSYLVANIA 19174

REVISED

PROPOSAL FOR CONTINUING RESEARCH SUPPORT

Museum Applied Science Center for Archaeology  
(MASCA)

National Science Foundation  
Division of Special Projects  
Washington, D.C. 20550

Principal Investigator: Froelich Rainey, Director, University Museum and  
Professor of Anthropology 198-26-6211

School: University of Pennsylvania

Department: University Museum

Starting Date: March 1, 1975

Duration: Two Years

FUNDS REQUESTED

|                                 |            |
|---------------------------------|------------|
| First Year (3/1/75 - 2/29/76):  | \$ 100,000 |
| Second Year (3/1/76 - 2/28/77): | \$ 75,000  |
| Total, two years:               | \$ 175,000 |

CORPORATE NAME OF UNIVERSITY: THE TRUSTEES OF THE UNIVERSITY OF PENNSYLVANIA  
(A Pennsylvania non-profit corporation)

Contracting Office: OFFICE OF RESEARCH ADMINISTRATION, Franklin Bldg., I6,  
University of Pennsylvania, 3451 Walnut Street,  
Philadelphia, Pa. 19174

Approved: Froelich Rainey  
Froelich Rainey  
Principal Investigator  
Director, University Museum and MASCA

Approved: \_\_\_\_\_

Approved: William E. Stephens  
William E. Stephens  
Professor of Physics  
Associate Director for Research

Approved: F. Otto Haas  
F. Otto Haas, Associate Director  
for Development

Date: February 6, 1975

Approved: Elizabeth K. Ralph  
Elizabeth K. Ralph, Faculty  
Associate, Associate Director  
of MASCA, Research Associate in  
Physics

VII Budget - First Year

1. Salaries and Wages

|   |                |
|---|----------------|
| a. Research Personnel (A-2)                 |                |
| 1. Three Research Fellows                   | \$ 14,400.     |
| Three summer months full time               |                |
| Academic year - half time                   |                |
| FTE - 8 months ( 3 x \$4,800)               |                |
| b. Other Professional                       |                |
| 1. Research Chemist (A-1) Mark Han          | \$ 14,300.     |
| Full time - 12 months                       |                |
| FTE - 12 months                             |                |
| c. Secretarial, Clerical and Administrative |                |
| 1. Research Bibliographer II (A-3)          | \$ 8,600.      |
| Full time - 12 months                       |                |
| FTE - 12 months                             |                |
| 2. Secretarial, Clerical and Administrative |                |
| Assistant (A-3)                             |                |
| Half time - 12 months                       | \$ 4,800.      |
| FTE - 6 months                              |                |
|   | TOTAL SALARIES |
|   | \$ 42,100.     |

d. Employee Benefits - First Year

March 1, 1975 to February 29, 1976

|                             |                             |                           |
|-----------------------------|-----------------------------|---------------------------|
| A-1                         | A-2                         | A-3                       |
| \$14,300 x 13.2% = \$1,888. | \$14,400 x 21.5% = \$3,096. | \$13,400 x 16% = \$2,144. |
| TOTAL EMPLOYEE BENEFITS     |                             |                           |
| \$ 7,128.                   |                             |                           |

2. Expendable Equipment and Supplies

|  |                            |
|--|----------------------------|
| a. For Thermoluminescence                              |                            |
| Two Po <sup>210</sup> alpha sources                    | \$ 500.                    |
| (These are listed under expendable equipment           |                            |
| because Po <sup>210</sup> is short-lived.)             |                            |
| Nitrogen and other chemical supplies, expendable       |                            |
| electronic components                                  | \$ 750.                    |
| b. For Archaeological Prospecting, Spare parts, cables | \$ 500.                    |
| and tools  |                            |
| c. For Aerial Photography                              |                            |
| Kites, filters, and other minor components             | \$ 500.                    |
| Films and film processing                              | \$ 500.                    |
| d. Information Center - Books, Journals and Supplies   | \$ 1,000.                  |
|  | TOTAL EXPENDABLE EQUIPMENT |
|  | AND SUPPLIES               |
|  | \$ 3,750.                  |

3. Services

|   |                |
|---|----------------|
| Rental of experimental prospecting instruments, including | \$ 2,000.      |
| soil-penetrating radar, gamma ray spectrometer, etc.      |                |
| Aircraft rental (for aerial photography)                  | \$ 500.        |
| Printing of MASCA Newsletter                              | \$ 1,500.      |
| Other printing and duplicating                            | \$ 500.        |
|   | TOTAL SERVICES |
|   | \$ 4,500.      |

VII Budget - First Year (continued)

4. Travel

For instrument, aerial surveys, other experiments  
in the field such as mud brick preservation

|  |                  |
|--|------------------|
| Domestic, collaboration with Stanford Research<br>Institute, etc. (travel expenses)<br>mud brick experiments in U.S.A.             | \$ 2,000.        |
| Foreign, Mud-brick and magnetometer, etc.<br>experiments in Iran, Egypt, and<br>other sites in the Near East,<br>possibly Far East | <u>\$ 3,000.</u> |

|              |           |
|--------------|-----------|
| TOTAL TRAVEL | \$ 5,000. |
|--------------|-----------|

5. Sub-total for the Calculations of Overhead

|                                   |                  |
|-----------------------------------|------------------|
| Salaries                          | \$42,100.        |
| Employee Benefits                 | \$ 7,128.        |
| Expendable Equipment and Supplies | \$ 3,750.        |
| Services                          | \$ 4,500.        |
| Travel                            | <u>\$ 5,000.</u> |

|           |           |
|-----------|-----------|
| SUB-TOTAL | \$62,478. |
|-----------|-----------|

6. Overhead

|  |                  |
|--|------------------|
| March 1, 1975 to February 29, 1976<br>44.5% of \$62,478. | <u>\$27,803.</u> |
|--|------------------|

|                            |           |
|----------------------------|-----------|
| 7. Sub-Total Plus Overhead | \$90,281. |
|----------------------------|-----------|

8. Equipment

|   |                |
|---|----------------|
| For Thermoluminescence<br>Hydraulic press (for sample preparations and<br>better grinding equipment)  | \$ 600.        |
| For Archaeological Prospecting<br>Excess cost of redesigning and upgrading of<br>cesium magnetometers | \$ 8,000.      |
| For Aerial Photography<br>Mapping equipment   | \$ 134.        |
| Portable Oscilloscope, Dual Trace, Storage  | <u>\$ 985.</u> |
| TOTAL EQUIPMENT   | \$ 9,719.      |

9. Total First Year

|           |                  |
|-----------|------------------|
| Sub-Total | \$ 62,478.       |
| Overhead  | \$ 27,803.       |
| Equipment | <u>\$ 9,719.</u> |

|                  |            |
|------------------|------------|
| TOTAL FIRST YEAR | \$100,000. |
|------------------|------------|

VII Budget - Second Year

1. Salaries and Wages

|  |                |            |
|--|----------------|------------|
| a. Research Personnel (A-2)                  |                |            |
| 1. Three Research Fellows                    |                | \$ 14,400. |
| Three summer months - full time              |                |            |
| Academic year - half-time                    |                |            |
| FTE - 8 months (3 x \$4,800)                 |                |            |
| b. Other Professional                        |                |            |
| 1. Visiting Scientist                        |                | \$ 4,840.  |
| Approximately 4 months                       |                |            |
| c. Secretarial, Clerical, and Administrative |                |            |
| 1. Research Bibliographer II (A-3)           |                | \$ 9,250.  |
| Full-time - 12 months                        |                |            |
| FTE - 12 months                              |                |            |
| 2. Secretarial, Clerical, and Administrative |                | \$ 5,160.  |
| Assistant (A-3)                              |                |            |
| Half-time - 12 months                        |                |            |
| FTE - 6 months                               |                |            |
|  | TOTAL SALARIES | \$ 33,650. |

d. Employee Benefits - Second Year

March 1, 1976 to February 28, 1977

|                            |                           |                             |
|----------------------------|---------------------------|-----------------------------|
| A-1                        | A-2                       | A-3                         |
| \$ 4,840 x 13.7% = \$ 663. | \$14,400 x 22% = \$3,168. | \$14,410 x 16.5% = \$2,378. |
| TOTAL EMPLOYEE BENEFITS    |                           | \$ 6,209.                   |

2. Expendable Equipment and Supplies

|   |   |           |
|---|---|-----------|
| a. For Thermoluminescence                       |   |           |
| Nitrogen, other chemical supplies, expendable   |   | \$ 1,000. |
| electronic components                           |   |           |
| b. For Archaeological Prospecting               |   | \$ 500.   |
| Spare parts, cables and tools                   |   |           |
| c. For Aerial Photography                       |   |           |
| Kites, filters, and other minor components, and |   | \$ 500.   |
| Films and Film Processing                       |   |           |
| d. Information Center                           |   |           |
| Books, Journals, and supplies                   |   | \$ 600.   |
|   | TOTAL EXPENDABLE EQUIPMENT AND SUPPLIES | \$ 2,600. |

3. Services

|   |                |           |
|---|----------------|-----------|
| Machine Shop                                    |                | \$ 250.   |
| Rental of experimental prospecting instruments, |                | \$ 1,000. |
| including soil-penetrating radar, gamma ray     |                |           |
| spectrometer, etc.                              |                |           |
| Aircraft rental (for aerial photography)        |                | \$ 500.   |
| Printing of MASCA Newsletter                    |                | \$ 1,500. |
| Other Printing and Duplicating                  |                | \$ 500.   |
|   | TOTAL SERVICES | \$ 3,750. |

VII Budget - Second Year (continued)

|  |                   |            |
|--|-------------------|------------|
| 4. Travel  |                   |            |
| For instrument, aerial surveys, other experiments in the field such as mud brick preservation etc. |                   |            |
| Domestic   |                   | \$ 2,000.  |
| Foreign  |                   | \$ 2,000.  |
|  | TOTAL TRAVEL      | \$ 4,000.  |
| 5. Subtotal for the Calculation of Overhead  |                   |            |
| Salaries   |                   | \$ 33,650. |
| Employee Benefits  |                   | \$ 6,209.  |
| Expendable Equipment and Supplies  |                   | \$ 2,600.  |
| Services   |                   | \$ 3,750.  |
| Travel   |                   | \$ 4,000.  |
|  | SUB-TOTAL         | \$ 50,209. |
| 6. Overhead  |                   |            |
| 44.5% of \$103,795   |                   | \$ 22,343. |
| 7. Sub-Total Plus Overhead   |                   | \$ 72,552. |
| 8. Equipment   |                   |            |
| For Thermoluminescence   |                   |            |
| Replacement amplifiers, scalers or minor new components  |                   | \$ 1,000.  |
| For New Techniques in Laboratory and in the Field  |                   | \$ 1,448.  |
|  | TOTAL EQUIPMENT   | \$ 2,448.  |
| 9. Total Second Year   |                   |            |
| Sub-Total  |                   | \$ 50,209. |
| Overhead   |                   | \$ 22,343. |
| Equipment  |                   | \$ 2,448.  |
|  | TOTAL SECOND YEAR | \$ 75,000. |
|  | TOTAL 2 YEARS     | \$175,000. |

NATIONAL SCIENCE FOUNDATION  
WASHINGTON, D. C. 20550

MAR 3 1975

Mr. Reagan A. Scurlock, Director  
Office of Research Administration  
University of Pennsylvania  
Philadelphia, Pennsylvania 19104

Proposal/Grant No.  
SOC75-04203

Dear Mr. Scurlock:

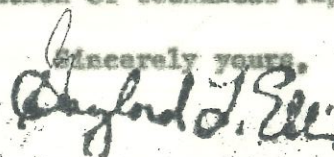
It is a pleasure to inform you that \$175,000 is granted to the University of Pennsylvania for support of the project entitled "Applied Science Center for Archaeology" as outlined in the above-numbered proposal. This project is under the direction of Froelich Rainey, University Museum.

The funds provided by this grant are intended to assist in the support of the project at the agreed level of effort for approximately twenty-four months. The NSF share of such support is summarized in the attached budget. The grant is effective March 15, 1975 and, unless otherwise amended, will expire on August 31, 1977. The grant period includes the flexibility period described in Section 120 of NSF 73-26, "NSF Grant Administration Manual."

The provisions of FI 25, "Administration of NSF Project Award," attached, are applicable to this grant.

Appropriate provisions of NSF 73-12, "Grants for Scientific Research," are applicable to the scientific or technical direction of the project and the preparation of technical reports.

Sincerely yours,



Gaylord L. Ellis  
Grants Officer

Attachments

seth

NATIONAL SCIENCE FOUNDATION

WASHINGTON, D.C. 20550

MAR 3 1975

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

Dear Fro:

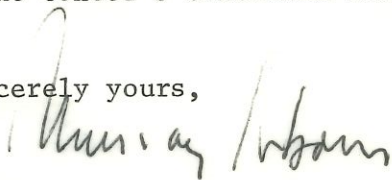
I am pleased to inform you that the National Science Foundation is able to continue its support for the Applied Science Center for Archaeology.

The enclosed materials provide information on the conditions of the grant and our administrative requirements. These are important and should be examined carefully.

If you have any questions now, or during the course of the grant, do not hesitate to get in touch with us.

We wish you the best of success with the Center's continued research operations.

Sincerely yours,



Murray Aborn  
Program Director for  
Special Projects

SOC7504203

Enclosures

May 8th, 1975

Mr. Reagan A. Scurlock  
Research Administration  
409 FB/I6

Dear Mr. Scurlock,

Re: NSF Grant SOC 75-04203

In regard to this new grant entitled "Applied Science Center for Archaeology (MASCA)", I am writing to request retrieval of some of the overhead from SDUS.

In the grant proposal as written originally, we requested \$364,405 (\$154,883 first year, 1/1/75-12/31/75 and \$209,522 second year, 1/1/76-12/31/76).

In January, 1975 we were notified by Dr. Murray Aborn, Program Director for Special Projects that the Social Sciences Division of the NSF might not have any money to fund our research. Therefore, we terminated three employees and found a small emergency grant to pay the salaries of the basic staff members for a few months.

In March, 1975 we were awarded this new grant, but the budget was cut drastically, namely,

|             |           |
|-------------|-----------|
| First Year  | \$100,000 |
| Second Year | 75,000    |
| Total       | \$175,000 |

Needless to say, many of our research activities have had to be curtailed.

In our previous grant, NSF GS-36308X, we received \$253,564 for two years (\$143,664 first year and \$109,900 second year) for which the lower overhead rate was charged.

For the new reduced grant, SOC 75-04203, my calculations of the excess overhead are as follows:

First Year (3/1/75-2/29/76)

|                   |               |
|-------------------|---------------|
| New Overhead Rate | \$27,803      |
| Old Overhead Rate | <u>15,577</u> |

|                  |        |
|------------------|--------|
| Difference       | 12,226 |
| Difference x 60% | 7,336  |

Second Year (3/1/76-2/29/77)

|                   |               |
|-------------------|---------------|
| New Overhead Rate | \$22,343      |
| Old Overhead Rate | <u>12,451</u> |

|                  |       |
|------------------|-------|
| Difference       | 9,892 |
| Difference x 40% | 3,957 |

Total to be retrieved \$11,293

I hope that you will look favourably upon this request.

Sincerely yours,

Elizabeth K. Ralph  
Associate Director of MASCA

FGR

# Approved  
8100

UNIVERSITY INTRAMURAL CORRESPONDENCE

OFFICE OF RESEARCH ADMINISTRATION

July 1, 1975

*4.602 Kathleen  
4.30 - Gail  
4.5 Jim*

Dr. Elizabeth K. Ralph  
University Museum/F1

Re: SDUS FY 76 and FY 77  
NSF Grant SOC 75-04203

Dear Dr. Ralph:

Your request for SDUS for above grant has been approved in the amount of \$8,100.

The award amount was computed as follows:

Overhead per award notice \$50,146 which was based on an I.C. rate of 44.5% NTDC. The same award if based on 37% S&W would have provided an overhead factor of \$28,027. Assuming a straight line award and applying the SDUS FY percentage rates the award should total \$8,100 for the next two years of the grant.

50,146 @ 44.5 NTDC  
28,027 @ 37% S&W  
22,119 or \$922. per month for 24 months.

Effective date of award was 3-1-75.

A. 4 months in FY 75 = \$3,688  
3,688 X 60% (FY 75 rate) = \$2,212.00

B. 12 months in FY 76 = \$11,064  
11,064 X 40% (FY 76 rate) = \$4,425.00

C. 8 months in FY 77 = \$7,376  
7,376 X 20% (FY 77 rate) = \$1,475.00

Total 2 year SDUS award            \$8,100.00

Your account number for this fiscal year (76) is 6-29390. Please contact this office for a new number for FY 77 since each account number is effective for only one fiscal year.

Dr. Elizabeth Ralph  
Page 2

Please submit a budget for this award.

Sincerely,

A handwritten signature in cursive script that reads "Reagan Scurlock". The signature is written in dark ink and is positioned above the printed name.

Reagan Scurlock

cc: J.J. Jackson  
Contract Accounting  
D.N. Langenberg

NATIONAL SCIENCE FOUNDATION

WASHINGTON, D.C. 20550

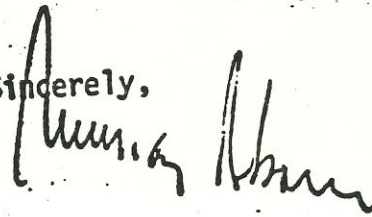
December 20, 1976

Dr. Froelich Rainey  
Director - MASCA  
University of Pennsylvania  
33rd and Spruce Streets  
Philadelphia, Pennsylvania 19174

Dear Fro:

You have our approval to reallocate the budget of Grant GSOC 75-04203  
in accordance with the details provided in your letter of December 11,  
1976.

Sincerely,



Murray Aborn  
Program Director  
Special Projects and  
Social Indicators

MASCA ACCOUNTS - January 13th 1977

Permission has been granted from NSF to transfer funds from 'current expense' (including equipment funds) to salaries. (See details on attached sheet B). Some funds have been left in 'current expense' to cover running costs until end of February (see attached sheet C)

Projected salary deficit up to end of February 1977 - \$7362.00  
(see Sheet A attached)

Funds to be transferred from 'current expense' on  
NSF SOC 75-04203 Grant (sheet B) \$6121.00

Funds available in SDUS account (6-29390) \$1064.00  
(retrieval of 7% of overhead on NSF Grant)

Funds available in MASCA General a/c (6-28033) 203.00  
TOTAL AVAILABLE + \$7388.00

Overhead in the amount \$50,146 comprising 44.5% of everything except equipment has been charged on NSF SOC 75-04203. However, 7.5% of this overhead charge has been refunded (\$8,100 - the difference between the old overhead charge of 37% and the new charge of 44.5%). See attached letter from the Office of Research Administration.

*Kathleen Ryan*

c.c. E.K. Ralph  
G. Swift  
W. Stephens  
F. Rainey

# THE UNIVERSITY MUSEUM



UNIVERSITY OF PENNSYLVANIA

THIRTY-THIRD AND SPRUCE STREETS  
PHILADELPHIA, PA. 19174

CABLE ADDRESS "ANTIQUE"  
TELEPHONE: EVERGREEN 6-7400  
(AREA CODE 215)

TO : MASCA Personnel Supported by NSF Grant No.  
SOC-75-04203

FROM : Froelich Rainey *ELR*

DATE : February 1, 1977

As you know, review of our grant proposal to NSF has been held up because of a reorganization of offices in NSF. The proposal has now gone back to the Special Projects branch under Murray Aborn where it has been for some years.

He tells me it has gone out for review and that it should be completed by the end of February. If it is approved in review then Murray assures me it will be funded by the Special Projects branch, and there is every reason to suppose that it will be approved by the review committee because Special Projects is very pleased with the success of MASCA.

However, salary money runs out by the end of February and I now have no Discretionary Fund to cover an interim period. If the review is satisfactory (Murray is to advise me by the end of February) then I will undertake to borrow the money for the interim period of perhaps two months until the grant money becomes effective.

But for the sake of the record, and procedures in the University, it is necessary to advise you now that your jobs must be terminated by the end of February if no funds are available. Certainly I don't expect this to happen. Beth or I will keep you posted.



**Museum Applied Science Center for Archaeology**

Froelich Rainey, Director

Elizabeth K. Ralph, Associate Director

THE UNIVERSITY MUSEUM • UNIVERSITY OF PENNSYLVANIA  
33rd & SPRUCE STREETS • PHILADELPHIA, PENNSYLVANIA 19104  
386-7400 (Area Code 215) Cable Address "Antique"

February 2, 1977

Mr. Howard C. Petersen, Chairman  
Board of Managers, University Museum

Dear Mr. Petersen,

The Applied Science Center for Archaeology (MASCA) has a crisis. Funds remaining in the current grant, NSF SOC-75-04203, are sufficient only to pay the salaries of the personnel through the month of February. Those affected are Mark Han, Bruce Bevan, Kathleen Ryan, and Gail Weinstein.

A new proposal (No. SOC 77-08186) was submitted to the NSF, but we do not expect to receive affirmative action until March or possibly the end of April 1977.

We need \$8,000 to support the salaries and employee benefits of the personnel for March and April, which we may retrieve from the overhead paid to the University on the current grant (NSF SOC-75-04203). Mr. Anthony Merritt, Acting Director, Office of Research Administration, has approved this transfer of funds.

David Crownover suggested that I write to you to obtain your permission to transfer these funds.

Sincerely yours,

*Elizabeth K. Ralph*

Elizabeth K. Ralph

cc. ~~Mr.~~ Mr. Merritt

cc. Mr. Biddle

*Mr. Peterson*

*agreed by*

*telephone*

*on Feb 2nd '77*

*[Signature]*

# Kathleen

Mark Han  
March &

April @ 1339 = 2678  
E.B. @ 12.2% 327 3005.00

B. Bevan @ 438 876  
March & April

E.B. @ 20.5% 180 1056.00

G. Weinstein  
@ 161.07 = 1450

K. Ryan } 3077  
@ 180.78 = 1627  
(March & April 9 weeks)

E.B. @ 15% 462 3539.00  
\$7600 7600

Extended to 4/30/77

xx Gloria

Permission was granted by the Office of Research Administration to retrieve some of the overhead paid by this grant (i.e. \$50,146.00) so the University Museum paid MASCA salaries for March and April (\$7600.00). The cost of minimum supplies for TL and some outstanding bills were paid from money which remained in non-salary categories of SOC 75-04203. As of mid-May funds in non-salary categories have also run out.

The Museum is now covering the salaries for May.

MARCH/APRIL

|              |                                |                |
|--------------|--------------------------------|----------------|
| M. Han       | Salary + 12.2% benefits        | \$3,005.       |
| B. Bevan     | " (part-time) + 20.5% benefits | \$1,056.       |
| G. Weinstein | " (9 weeks) + 15% benefits     | \$3,539.       |
| K. Ryan      | " (9 weeks) + 15% benefits     | <u>\$7,600</u> |

MAY

|       |                         |                 |
|-------|-------------------------|-----------------|
| ditto | approximately \$3800.00 | <u>\$3,800.</u> |
|-------|-------------------------|-----------------|

JUNE

|              |                            |                   |      |
|--------------|----------------------------|-------------------|------|
| M. Han       | Salary + 12.2% benefits    | \$1,502.          | 1502 |
| G. Weinstein | " (5 weeks) + 15% benefits | \$ 926.           | 185  |
| B. Bevan     | resigning                  |                   | 1687 |
| K. Ryan      | on unpaid leave of absence |                   |      |
|              |                            | <u>\$2,428.00</u> |      |

JULY/AUGUST (Benefits increase 12.2% to 18% for A-1 staff, 20.5% to 24.03 for A-2, 15% to 23% for A-3)

|              |                            |                 |
|--------------|----------------------------|-----------------|
| M. Han       | Salary + 18% benefits      | \$3,160.        |
| G. Weinstein | " (9 weeks) + 23% benefits | \$1,783.        |
| K. Ryan      | " (4 weeks) + 23% benefits | <u>889.</u>     |
|              |                            | <u>\$5,784.</u> |

SEPT/DEC 31st

|                    |  |          |
|--------------------|--|----------|
| M. Han             | Salary + 18% benefits  | \$6,320. |
| K. Ryan            | " + 23% benefits   | \$4,002. |
| 3 Research Fellows | Salaries (part-time) + 24.03% benefits<br>(\$544 each per month) | \$6,528. |

NATIONAL SCIENCE FOUNDATION

WASHINGTON, D.C. 20550

April 12, 1977

Dr. Elizabeth K. Ralph  
Associate Director  
Museum Applied Science Center for Archaeology  
University of Pennsylvania  
33rd and Spruce Streets  
Philadelphia, Pennsylvania 19104

Dear Beth:

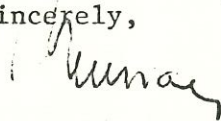
External review of the MASCA proposal is now completed, and we are beginning internal deliberations that will lead to a final decision on this facility-type request. If the decision is negative, we will hasten to let you know in the shortest time possible. If the decision is positive, it will still take some further time to ascertain whether there are sufficient funds to make an award. As I have explained before, facility-type requests in the field of anthropology/archaeology no longer have a distinct "home" in the Special Projects Program. Our program in Anthropology, on the other hand, has judged the proposal to be inappropriate for consideration in its present form--although it may be willing to contribute some funds on behalf of the proposed work in thermoluminescence.

That part of the proposal dealing with continued research on the refinement of thermoluminescence techniques thus assumes pivotal importance, and we are disquieted to find several reviewers expressing the opinion that researchers at MASCA do not keep abreast of highly relevant developments going on elsewhere, and that they therefore fail to incorporate significant advances in TL methodology in their own work. I am enclosing some reviewer comments containing specific criticisms of MASCA's plans for further research in this area. Because of their highly technical nature, I am transmitting these comments verbatim.

We would be interested in having your response to the questions and assertions raised therein. I am also enclosing some similar (but less detailed) criticism of MASCA's work on the preservation of mud-structures. We should like to have your response to this criticism too.

We may wish to raise other questions with you in the course of the next few weeks. Should that be the case, I will be in touch by letter or phone. Meanwhile, please go ahead with whatever response to the enclosed comments you are prepared to provide.

Sincerely,

A handwritten signature in cursive script, appearing to read "Murray".

Murray Aborn  
Program Director  
Special Projects &  
Social Indicators



**Museum Applied Science Center for Archaeology**

Froelich Rainey, Director

Elizabeth K. Ralph, Associate Director

THE UNIVERSITY MUSEUM • UNIVERSITY OF PENNSYLVANIA  
33rd & SPRUCE STREETS • PHILADELPHIA, PENNSYLVANIA 19104  
386-7400 (Area Code 215) Cable Address "Antique"

May 12th, 1977

Mr. Martin Biddle  
The Winchester Research Unit  
13 Parchment Street  
Winchester, Hants.

**SUBJECT:** Recent Problems Concerning Renewal of NSF Grant for MASCA

On April 15th Kathleen Ryan (KR) visited Dr. Murray Aborn, NSF Program Director of Special Projects, Social Science Division in Washington. The purpose of the visit was to hand-deliver our answers to some specific queries and criticisms made by one of the reviewers. Dr. Aborn expressed satisfaction with our response. Our reply would then be shown to specialists in the appropriate fields and they would judge if our response was adequate. At that point Dr. Nancie Gonzalez, NSF Program Director for Anthropology, would again be consulted for her approval for the transfer of some funds from the Anthropology Section to fund the TL part of the proposal. It was also possible that a very small amount of money might be siphoned out of Dr. Aborn's own section. However, this would still leave the bulk of the funds uncovered. Dr. Aborn had already made an application to NSF discretionary funds pending approval of the proposal, although he gave no guarantee that discretionary funds would be forthcoming. The fact that he had applied on our behalf merely expressed his own support for our project and his wish to help us get funded.

On Tuesday 26th April Dr. Rainey telephoned MASCA to inform us that Dr. Aborn had called him and requested him to reduce the MASCA proposal budget by \$20,000. The implication was that if we did reduce the budget, we would be funded. Our information via Dr. Rainey was that 1) the proposal has been approved both in review and within NSF 2) Dr. Gonzalez had agreed to release some funds from Anthropology for TL 3) the remainder would come from NSF discretionary funds and 4) that approval of funds could be rushed through in 30 days.

May 6, 1977 - Conversation - F.G. Rainey and E.K. Ralph in MASCA.  
FGR - NSF Grant has been approved - should expect it within a month.  
FGR - Museum will support interim salaries (\$4000 per month)

(EKR assumed that this was a commitment thru June)

May 11, 1977 - Telephone conversation Murray Aborn (NSF) and EKR, initiated by EKR.

NSF approval of grant renewal with budget reduced to \$129,035 for one year only, dated 4/29/77, has not been obtained.

Small amounts of NSF funds have been budgeted from Special Projects (Aborn) and from Anthropology (Gonzalez).

The rest, which is by far the largest amount, has not been approved nor budgeted by Aborn's NSF Director. Whether or not this will be approved should be known within 30 to 45 days.

If we accepted the small amounts from Special Projects and Anthropology, this would be sufficient only to support four salaries for a few more months (no specific figures were divulged).

Also, it would eliminate the total grant request. In other words MASCA would simply die more slowly.

Dear Martin,

Please forgive me for sending you more bad news, but I wanted to bring you up-to-date in regard to the present lack of developments.

My personal feeling, after talking to Murray Aborn, is that MASCA will be funded in October 1977, but probably not sooner. The important salaries to maintain during the summer would be those of Kathleen Ryan and Mark Han. Bruce Bevan is finishing his graduate studies and has found a good job for the summer. Gail Weinstein is planning to leave to go to Cornell University with her husband in the fall.

With best regards,

Beth

BACKGROUND OF DIFFICULTIES WITH PREVIOUS MASCA GRANT PROPOSAL

SOC 75-04203

In October 1974 a grant proposal was sent to Special Projects, Social Sciences Division of NSF requesting funds for two years beginning January 1 1975.

|                                 |           |
|---------------------------------|-----------|
| First Year (1/1/75 - 12/31/75)  | \$154,883 |
| Second Year (1/1/76 - 12/31/76) | \$209,522 |
| Total two years                 | \$364,405 |

(see detailed budget)

The proposal was approved but we were requested to reduce our budget as follows:-

|                                |  |
|--------------------------------|--|
| First Year (3/1/75 - 2/29/76)* | \$100,000  |
| Second Year (3/1/76 - 2/28/77) | \$ 75,000  |
| Total                          | \$175,000 (\$50,146 was overhead paid to the University) |

(see detailed budget)

No salary allocation was made for TL personnel in the second year (only one Research Fellow was funded as a TL lab assistant). In other words there was no salary allocation either for Mark Han or for the slot just vacated by Gary Carriveau. NSF intimated that funds should come from the university to cover salaries of permanent research staff. Gary Carriveau's position was left unfilled; a second Research Fellow for TL was terminated. Dr. Ralph was able to retrieve \$8,000 from overhead, but obviously this was not enough to cover the gap in salaries. Since no funds were forthcoming either from the University or outside, we had to request permission from NSF to use most of the funds remaining in our budget to cover salaries from January to March when we hoped that our new funds would arrive. Not only had our salary category been cut to a minimum, but every category had to be pared down to keep us to a limit of c. \$155,000 (less overhead) for two years. MASCA has merely limped along for two years.

\* NB There was also a three month hiatus from January 1975 to March 1975 when we were again waiting for NSF to come through and we were then bailed out by an allocation of \$5,000 from Dr. Rainey's slush fund.

## BACKGROUND OF DIFFICULTIES WITH CURRENT MASCA GRANT PROPOSAL

In December 1976 a grant proposal was sent to the Social Sciences Division, Special Projects of the National Science Foundation requesting funding for MASCA for two years from March 1977 to February 1979. At this point we were informed by Dr. Aborn via Dr. Rainey that we could no longer apply to the Social Sciences Division (all anthropological/archaeological projects would be funded from the Behavioral Sciences Division). Our proposal had been written on the assumption that we were applying to Social Sciences, Special Projects as usual. However, it was considered too late to go back and rewrite the proposal following the guidelines set out by the Anthropology Section which is now housed in the Behavioral Sciences Division. The proposal was sent without change to Dr. Nancie Gonzalez, Program Director for Anthropology. After 6-8 weeks of deliberation, Dr. Gonzalez announced that the MASCA proposal, in its present form, was not appropriate for funding from Anthropology funds. The proposal was then sent back to Dr. Aborn and was finally sent out for review by Dr. Aborn at the end of February 1977. Some queries made by Dr. Gonzalez (see Dr. Aborn's letter dated Jan. 26) were replied to by Dr. Ralph (letter to Dr. Aborn Feb. 1).

On April 12, Dr. Aborn informed us that the external review of the proposal was completed and requested that some criticisms should be responded to (letter dated April 12 from Dr. Aborn to Dr. Ralph).

KR  
May 12th, 1977

|       | A 1     |                   |         | A 2    |                   |         | A 3     |                   |         |                                 |
|-------|---------|-------------------|---------|--------|-------------------|---------|---------|-------------------|---------|---------------------------------|
|       | Salary  | Employee Benefits |         | Salary | Employee Benefits |         | Salary  | Employee Benefits |         |                                 |
| March | 1339.00 | 208.00            | 1547.00 | 438.00 | 100.00            | 538.00  | 1709.00 | 342.00            | 2051.00 |                                 |
| April | 1339.00 | 208.00            | 1547.00 | 438.00 | 100.00            | 538.00  | 1367.00 | 273.00            | 1640.00 |                                 |
|       |         |                   | 3094.00 |        |                   | 1076.00 |         |                   | 3691.00 | \$ 7 8 6 1.00 Total<br>2 months |

MASCA - Monthly Salaries  
NSF SOC 75 04203

1/22/77

|                      |            |            |
|----------------------|------------|------------|
| Mark Han (A-1)       | 1300       | 1300       |
| Bruce Bevan (A-2)    | 450        |            |
| Kathleen Ryan (A-3)  | 800        | 800        |
| Gail Weinstein (A-3) | <u>700</u> | <u>800</u> |
| Total Salaries       | 3250       | 2100       |

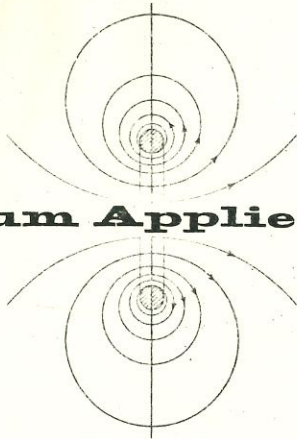
Employee Benefits

|                         |            |            |
|-------------------------|------------|------------|
| A-1                     | 178        | 178        |
| A-2                     | 99         |            |
| A-3                     | 248        | 130        |
| Total Employee Benefits | <u>525</u> | <u>308</u> |

Total / month 3775 2408

Total - 2 months \$ 7550

Alborn 202-632-4216



## Museum Applied Science Center for Archaeology

Froelich Rainey, Director

Elizabeth K. Ralph, Associate Director

THE UNIVERSITY MUSEUM • UNIVERSITY OF PENNSYLVANIA  
33rd & SPRUCE STREETS • PHILADELPHIA, PENNSYLVANIA 19104  
386-7400 (Area Code 215) Cable Address "Antique"

July 29, 1977

Dr. Murray Aborn  
Program Director for Special Projects  
National Science Foundation  
1800 G Street  
Washington, D.C. 20550

Dear Murray:

Here is the final report on NSF Grant SOC 75-04203 for the period ending February 28, 1977. With the delay on a decision regarding the grant for the coming year, we have been hard pressed to keep the MASCA staff together during the past four months, but I am pleased to report that the University Museum has come through with just enough money to maintain the center, and we are still afloat to continue during the next year. Let me add that I am grateful, indeed for your efforts to support MASCA under your new reorganization and I am also sure that it will be well worth it.

Martin Biddle, who will take over as the University Museum Director in October, and I, will be in touch with you in the fall regarding the transfer of the position as Principal Investigator of the Grant and Director of MASCA from me to him, and also with regard to the re-direction of MASCA activities under the new set-up. If this is transferred to the Anthropological Division of NSF, I understand that MASCA could become more a service organization than a research development program for new and original techniques in archaeology.

From an overall point of view, I think MASCA has maintained a high level of performance in original research to develop new scientific techniques which, of course, has always been our principal purpose. Thermoluminescence has come of age as a successful dating technique, even though a general understanding of the process by all laboratories -- both the scientific system and the detailed application -- has been more delayed than I expected. Without the experience of the MASCA lab, uncertainty in the newly-established labs has had an effect upon potential users of the dating process and we still have some way to go for general acceptance by archaeologists. Experiments with the new ground-penetrating radar have also been successful and we think that this can be much improved for archaeological survey. As you know, we have had our second extensive conference with the engineers from the Space Research Center of General Electric at Valley Forge and we are all optimistic

about the use of the next two generations of Landsat for archaeological survey. Again, most archaeologists are unaware of the greatly improved resolution of images in these next satellites to be launched in 1978 and 1980, and it will take some time before this is fully applied.

There is now no doubt at all that we have found a successful chemical process for the preservation of mud brick and porous stone structures, which is economically feasible. The primary problem at the moment is to demonstrate this on a scale and at a rate that will have a real impact on potential users. Currently there are plans for such demonstrations in Guatemala, Morocco, and Jordan -- i.e., Tikal, a royal palace in Fez, and Petra.

MASCA with financial aid from the Earth Sciences Division of NSF, continues to improve C-14 dating and the correction factors. Such research will continue along with the emphasis in the dating of current archaeological discoveries in the coming years.

Probably because the Physics Department of the University of Pennsylvania is closely tied to MASCA through Professor William Stephens and Elizabeth Ralph, there is much more basic research on new techniques carried out by MASCA than is apparent in our applications and reports. The same applies to the Laboratory for Research on the Structure of Matter at the University. In any case, the purpose of MASCA is to collaborate with many research institutions both in universities and in industry, and I believe that is clear from our reports.

The following reports will give a more detailed account of progress during the past grant period.

All best wishes,

Froelich Rainey  
Director, MASCA

~ 8/77

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NSF - Grant SOC 75-04203  
Museum Applied Science Center for Archaeology (MASCA)  
Two-Year Report 3/1/75 - 2/28/77

by  
Froelich Rainey, Principal Investigator  
Elizabeth K. Ralph, Faculty Associate

The overall activities of MASCA are described in Froelich Rainey's accompanying letter. Some of the detailed research projects are reported in the enclosed MASCA Newsletters, vol. 11, nos. 1 & 2 and vol. 12, nos. 1 & 2.

Specific subjects are as follows:

## II Thermoluminescence (TL)

A) "Effects of Alpha and X-Ray Doses and Annealing Temperatures upon Pottery Dating by Thermoluminescence" by Mark C. Han, (MASCA vol. 11, no. 1, pp. 1-3).

The important discovery was the fact that the sensitivity of pottery to radiation damage is increased with increasing original firing <sup>(or annealing)</sup> temperatures. This may necessitate the use of different calibrations for ~~specific~~ ~~each~~ range of firing temperatures.

B) "The Thermal Behaviour of Clays and Possible Methods of Determining Firing Temperatures of Pottery" by Julia L. Handy and Alan M. Gaines (MASCA, Vol. 11, no. 1, pp. 3-4).

This was a supplemental study in conjunction with (IA), but was more basic in regard to the mineralogy and thermal behaviour of clays. As mentioned, more studies of dehydroxylation are required.

C) "Analyses and Thermoluminescent Dating of a 'Chung'" by John P. Rappolt (MASCA vol. 11, no. 1, p. 10).

This bronze bell contained fired "earth" within its handle which enabled it to be dated by TL. The date of 1500 B.C. is consistent with its style. In addition, chemical analyses revealed that the so-called bronze consisted of 99% copper.

D) "TL Dating of Burnt Soil" by R. J. Carpenter & K. Ryan (MASCA, vol. 11, no. 2, p. 7).

A. TL date consistent with <sup>14</sup>C dates of the ceremonial site was obtained ~~from~~ with a sample of burnt soil from Dún Ailinne, Ireland.

E) In addition to the published reports, many series of sherds have been dated. The major projects ~~had~~ recently were concerned with samples from the University Museum's excavations at Ban Chiang, Thailand and from Las Flores, Coamo, Puerto Rico. Long series of both TL & <sup>14</sup>C dates have been obtained & the correlations are being studied.

F) Germanium Detector  
The use of a sensitive Lithium-doped Germanium Detector with associated components, both <sup>made</sup> available for <sup>temporary</sup> experimental use <sup>by Prof. Wm. Stephens</sup> in the Tandem Accelerator Facility, Department of Physics, has enabled the total inherent radioactivity in pottery to be measured for the first time. The Germanium Crystal

is an extremely sensitive detector of gamma rays in the ranges of energies emitted in the decay series of Uranium & Thorium in pottery as well as the beta emissions from <sup>40</sup>K. The measurements provide the exact ratio of U to Th ~~and~~ and also <sup>indicate</sup> the absence (or presence) of radon & possibly <sup>are gases which</sup> Thoron escape, both of which <sup>are gases which</sup> affect the overall dose of inherent radioactivity.

Comparisons of the total radiation doses in pottery as measured with the Germanium Detector are in good agreement with ~~the~~ our previous overall alpha-counting ~~of~~ of U & Th combined, & with flame photometric determinations of <sup>40</sup>K. However, much more information is provided, especially in regard to the U/Th ratios (essential for "absolute" TL dating) & the possible escape of radon.

The use of the new Germanium detector is such a significant break-through that it will soon be copied by M.J. Aitken at Oxford University.

## II) Near & Remote Sensing

### X A) Soil-Penetrating Radar

1) "A Communication on an Archaeological Radar Experiment at Chaco Canyon, New Mexico" by Roger S. Vickers & Lambert T. Dolphin (MASCA, vol. 11, no. 1, pp. 6-8)

This was the first experiment conducted jointly by <sup>Stanford Research Institute</sup> (SRI) & MASCA at an archaeological site with the new SRI soil-penetrating radar equipment. Chaco Canyon is a suitable site because of the dryness of the earth & the consequent contrast in dielectric constants between the soil & the buried structures. Some features were detected & much was learned in regard to improvements in the apparatus & especially the method of recording the results to make the system more practical.

X It is anticipated that soil-penetrating radar will complement our standard techniques of archaeological prospecting. It can be employed at sites with magnetic clutter where magnetometers are not suitable. Also, at many sites it has the capability  
(over)

of providing more information & greater penetration in depth than resistivity surveying & is also much faster to use.

2) "Ground - Penetrating Radar for Historical Archaeology" by Bruce Bevan & Jeffrey Kenyon (MASCA, vol. 11, no. 2, pp. 2-7),

This experiment was conducted jointly by Geophysical Survey Systems, Inc. <sup>(GSS)</sup> & MASCA at an historical site with similar but commercially-available

soil-penetrating radar equipment. Anomalies were detected which represented known & possibly unknown buried features.



## B) Magnetometer Survey

1) "A Magnetic Survey at Les Forges du Saint-Maurice" by Bruce Bevan (MASCA, vol. 11, no. 2, p. 1).

This was a cesium magnetometer survey conducted in a region of a former iron industry. Therefore, anomalies were large & gradients difficult to interpret. However, there was some correlation between anomalies & possible archaeological-historical features.

Y > [add from next page]

## c) Soil-Penetrating Radar & Magnetic Survey

At one of the MASCA test sites in Valley Forge National <sup>Historical</sup> Park, the area was surveyed with GSS soil penetrating radar. <sup>The differing soil strata were revealed clearly,</sup> a prominent linear feature was detected.

This <sup>linear</sup> anomaly was not detected in a subsequent cesium magnetometer survey, which indicates that it is not a "modern" iron pipe, but may be of greater interest.

1a  
~~Possible additions for p. 7: Magnetometer survey~~

4) 2) Other magnetic surveys

2) "A Magnetic Survey at Quirigua (Guatemala)", by Bruce Bevan, to be published in Quirigua Papers, University Museum

At this Mayan site in Central America, ~~a cesium magnetometer~~ <sup>was</sup> ~~used~~ <sup>to be</sup> ~~traced~~ a stone structure, possibly a buried causeway, ~~traced~~ <sup>with a cesium magnetometer</sup>. While the primary architectural stone at the site furnished no magnetic contrast, magnetic river cobbles used as foundation fill allowed indirect detection of this feature.

In collaboration with the University of Illinois, a magnetic survey was made at Cahokia Mounds, near St. Louis, in August 1976. The magnetic gradients were extremely small and no definite detection of Indian earth works was possible in the area which was mapped.

Additional surveys were made by MASCA staff at Governor Printz Park and at Yellow Springs, both near Philadelphia. The excavation of these sites has just begun and so the value of these surveys is not yet known.

### D) Resistivity Surveys

1) Members of MASCA demonstrated the use of the Geohm (resistivity instrument) & instructed associates of the Mount Clare House (Baltimore, Md.) in its use. Members of their archaeological society have continued to conduct surveys at the site throughout the summer (1977). In the course of the demonstration, one out-building was detected & it is anticipated that others will soon be reported.

2) Resistivity surveying has been resumed (summer 1977) at Dún Aileán, Ireland, especially, in search of the entrances of the fortification walls.

### E) Aerial Photography

In conjunction with magnetic surveys, aerial photographs for reconnaissance and site illustration were taken at Les Vieilles Forges in Canada, Quirigua in Guatemala, and at Yellow Springs in Pennsylvania.

Quirigua & Chimaltenango, G  
Exposure Sta.  
Florida Atlantic Univ., Boca Raton

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marshes  
& Petrol  
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### Mud Brick and Stone Preservation

Dr. Darrel J. Butterbaugh, a chemist & Research Associate (volunteer) at MASCA has conducted research since 1972 toward the development of suitable methods for the conservation of mud brick & stone structures, especially, at archaeological sites. Acrylic emulsions and catalyzed mixtures of methacrylate monomers <sup>solution</sup> & polymers have been tested.

~~Field trials have been conducted~~ locally. Initial experiments have <sup>been</sup> conducted in the laboratory & treated samples are <sup>then</sup> cycled artificially - wet-freeze-thaw, simulated ground water with paper wicks & air fans, sand blasting, etc. Out-of-door endurance tests are <sup>then</sup> performed locally on Museum roof & objects in the gardens as well at ~~an~~ ~~an~~ ~~an~~ an exposure station at Florida Atlantic University in Boca Raton. Actual field tests on mud bricks ~~being~~ have been conducted at Chaco Canyon, New Mexico; Quirigua & Chimaltenango, Guatemala, and Hasanlu, Iran. Inspections after one year or more have illustrated that the treated walls are withstanding weathering & erosion extremely well & have indicated which treatments are best.

~~13~~ ~~12~~

Additional tests have been made recently in the laboratory on samples of Greek marble & stone from Petra which may lead to experiments at the sites.

~~DEC 20, 1976~~

Extract from memo from G. Swift to R. Lyoff --  
concerning an audit report dated March 31,  
1978.

IV. Contracts and Grants

A. In re changes in salary expenditures, please find attached copies of correspondence related to the overexpenditure of approximately \$7000 and the NSF approval to do so. Copies of these were sent to ORA at the time. Perhaps they should be sent to Accounts Payable as well. ~~As for the use of graduate student money for the A-I non-faculty professional salary, my recollection is that I discussed this matter with Dr. Ralph, suggesting that she write a letter to the NSF to get approval. I cannot find such a letter and Dr. Ralph is ill. However, I will pursue the matter and try to determine what happened.~~

Covered by request for attached

B. It has al

NATIONAL SCIENCE FOUNDATION

WASHINGTON, D.C. 20550

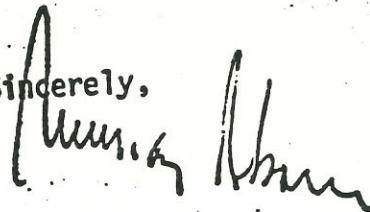
December 20, 1976

Dr. Froelich Rainey  
Director - MASCA  
University of Pennsylvania  
33rd and Spruce Streets  
Philadelphia, Pennsylvania 19174

Dear Fro:

You have our approval to reallocate the budget of Grant GSOC 75-04203  
in accordance with the details provided in your letter of December 11,  
1976.

Sincerely,



Murray Aborn  
Program Director  
Special Projects and  
Social Indicators