3/12/70

UNIVERSITY of PENNSYLVANIA
PHILADELPHIA 19104

The College
CLASSICAL STUDIES

Thursday p.m.

[Re Luc DAELS]

Dear Betty,

Here is the dope on the admirable Luc Daels. Resume, his curriculum vitae and bibliography I include a proposal he has made for work with us and a general bibliography he prepared for Julian Wh. Harvey. This summer he will be doing field work in Amorgos (one of the Cyclades). He would be interested in a visiting term here in the fall, I believe, and McHarg's Ford money might flesh out research money you may have.

But Sieg[illegible] knows the

matters set up — I don't

know.

Good to see you

peripatetic again,

Mike

Dr. Luc DAELS
Kwakstraat 5
ST.MARTENS-LATEM
Belgium

- C U R R I C U L U M V I T A E -

- Luc DAELS, born at Gent 22.5.1929
- Secondary studies ; autodidaet
- Certificate of Greek-Latin humanities for the central homologation commitee in Brussels, September 1949
- Certificate of licentiate in geographical sciences State University Ghent, 1953
- Certificate of aggregation for the secondary teaching State University Ghent, 1953
- Geography teaching in boys highschools from 1953-1959
- First assistant tot the Seminar for Regional Geography, State University Ghent 1959-1963
- Ph.D.degree (doctoral thesis) with the greatest distinction ; State University Ghent, 1963
- Lecturer in geography and photo-interpretation at the State University Ghent, 1963
- Director of the Geographical Survey of the Cyclados islands (Greece). (State University of Ghent, Mountain Economy Survey Athens), 1965-66-67-68-69
- Guest-lecturer (physical geography and airphoto-interpretation) University of Pennsylvania - Philadelphia 1969-70
- Director of a research programm (Fundamental study of the aerial photo image) subsidized by the N.F.W.O. (National Fundation of Scientific research).

Dr. Luc DAELS
Kwakstraat 5
ST.MARTENS-LATEM
Belgium

PUBLICATIONS

1) Plantaardrijkskundige studie van een gebied rond de Kraenepoel.
Biol.Jb. Gent 1956, nr 23, pp. 44-71

2) De bodemkaart als didactisch materiaal in het middelbaar onderwijs. La Géographie - De Aardrijkskunde, 49, 1959

3) Nieuws van het Centrum voor Bodemkartering.
La Géographie - De Aardrijkskunde, 46, 1960

4) Landschapsontwikkeling in en rond het voormalige Bulskamp-veld.
Ts.Belg.Ver.Aardr.Studies, 1962, pp. 191-228

5) Verslag over de ekskursie van 20 mei 1962 doorheen het Houtland, het Meetjesland en het Land van Waas.
Ts. Belg. Ver. Aardr. Studies, 1962, pp. 347-356
F.SNACKEN, G.DE MOOR en G.SCHMOOCK

6) Parcellement actuel et parcellement ancien en Flandre.
Actes du Colloque d'archéologie aérienne, S.E.V.P.E.N. Paris 1964

7) Enkele resultaten van geografische luchtfotointerpretatie voorgebracht op het "Colloque d'archéologie aérienne" te Parijs (1963). Natuurw. Ts. nr 45, 1964,pp. 137-139

8) Les déformations topographiques de la carte de Ferraris.
Ts. Nelg. Ver. Aardr. Studies, T. XXXII, 1963, nr 2, pp. 301-310

9) Luchtfotografisch onderzoek in een ontwikkelingsland.
Proeve van landschapsanalyse in het gebied van Kandé (Togo)
Natuurw. Ts. 46, 1964, pp. 199-204, samen met RACIM ST. ANNA

10) Photo-interprétation dans un pays en voie de Développement.
Analyse du paysage dans la région de Kandé (Togo). (with the collaboration of Racim Sant'Anna)

11) The transformation of the landscape in interior Flanders.
Abstr. of Papers - 20th intern. geographical congress - London 1964

12) Parcellement actuel et parcellement ancien en Flandre.
Photointerprétation - Technip, 1965/1

13) Landscape contrast : A region of polders and a Sandy-Silty Region.
Revue "Photointerprétation" nr 4, 1965 - fasc. 3

14) Classification des types de paysage, appliquée aux îles Cyclades.
Int. Arch. Photogramm. Vol. 16, 1966 - Classification of landscape types, applied on the Cyclados islands (Greece)

15) Luchtfoto's en hun toepassingen (samen met W.DE BREUCK)
Manual ca. 230 p. (Uitg. Story-Scientia Gent, 1967)

16) Photo-interpretation of the Nile-formations. Contributions of the prehistory of Nubia (assembled by Fred Wandorf. Fort Burgwin Research center and Southern Methodist university Press)

17) The transformation of the landscape in interior Flanders. Pedologie, XVIII, 2, pp. 228-237, 6 fig. Ghent, 1968

18) Circulaire vormen in het perceelspatroon van Vlaanderen, onderzoek gebaseerd op luchtfotointerpretatie - Belgisch centrum voor Landelijke geschiedenis, Gent 1970
Circular forms in the parcelment pattern of Flanders, a study based upon aerial photo-interpretation.
Ghent, 1970

19) Under the direction of Dr.L.Daels some islands of the Cyclades archipel (Greece) were studied ;
Naxos - human environment (A.DE LANGHE)
Syros - physical en human environment (H.RIENCKENS)
Paros - physical environment (M.DE DAPPER)
Paros - human environment (M.ANTROP)
Tinos - physical environment (J.VERMEIRE)
Tinos - human environment (M.R.DELAHAEY).

The main themes of my work were investigations in the field of historical geography and research work with airphotos, in view of applications on problems of regional planning.
The result of the historical geographical research led to the obtaining of a Ph.D. degree and some publications one of these treating landscape evolution in interior Flanders since the last glaciation, an other (in collaboration with drs. A.VERHOEVE) on the accurateness of the topographical map of Ferraris (1770), and in a last one aberations of the parcelment pattern, circular forms, were studied.

Some of the results of airphoto-interpretation have been published. The problem of ancient landscape structures was discussed at the "Colloque international d'archéologie aérienne) at Paris in July 1963 and printed in its "archives". The results of the research work with airphotos were published (together with Dr.W.DE BREUCK) as a Manual 230 pp. The problem of landuse and population density has been studied in a selected region of Togo, the results of which were published (with the collaboration of Ir.RACIM SANT'ANNA) in "Natuurwetenschappelijk Tijdschrift", Ghent, 1964).

The problem of applied geography was studied on the islands of the Cyclades (Greece). There, with aid of aerial photos, a survey of the most important features of the landscape was made such as the lithology, the soils, the land-use, and the habitations. (study 1965-66-67-68-69).

Suggestions concerning a geographical survey of the region of Argolis (Greece).

A. Proceeding

This kind of survey is based upon a foregoing interpretation of aerial photographs. The meaning of this work is to obtain a first knowledge of the region to be studied and to have a first orientation of the field work.

The second step consist in the field work. By a extensive comparison between the field reality and the characteristics of the aerial photography (tonality, texture and structure) the estabishment of the interpretational keys is realised.

During the field trip also some control points are fixed in relation with the calculations of stereo-level and resolution.

The last step is the realisation of the interpretation and the final carthography.

B. Results

The result of such a geographical survey is the elaboration of some original maps. Normally the study material is divided in two main groups. The features of the physical environment and those of the human environment. Each map is widely explained by a text.

Physical environment

1. Map of the relief forms : slope degree, slope orientation and slope shape. Some remarks in relation with erosion are added.
2. Map of the drainage pattern and of the hydrological conditions.

3. Lithological map with indications concerning the most important soil units.

Human environment

1. Map of the agricultural landuse, some sample units are more closely studied.
2. Map of the fieldplots ; shape, dimensions, flat or terras etc. (An attempt will be made to discern the abandoned terraces, the old and the recent ones).
3. Map of the habitations and the roads. Here also the abandoned the old and the new ones are separated. A carthography of the traces of the now disappeared habitations and roads wille be executed.

C. Way of realisation

To realise this program the following conditions must be fulfilled :

1. A reconnaissance stay in Argolis of the leader of the survey (Dr.L.Daels summer 1970).
2. A preliminary study of the aerial photographs (stafmembers of the center for photo-interpretation with a view to the orientation of the field-work - State University of Ghent, Fall 1970).
3. Field campaign ; 8 weeks - Summer 1971 ; leader of the survey and two stafmembers (Dr.L.Daels, Lic.sc.M.Antrop and lic.sc.M.De Dapper).
4. Comparisson between photo-characteristics and the field data, estabishment of the interpretational keys and the final interpretation (Fall 1971).
5. Cartography of the new maps and redaction of the explaining texts (Spring-Summer 1972).

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Prise de date pour la découverte par prospection aérienne de nombreux vestiges protohistoriques.
Bull.Soc.Préhistorique Française, Paris, 1960, pp 29-31

Archéologie Aérienne et techniques complémentaires, 1963

Institut pédagogique National, Paris

ASCHENBRENNER, C.M. 1954

Problems on getting information into and out of air photographs.
Photogrammétric Engineering 20 (3), pp. 398-401

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Ait photography in Archaeology.
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pp. 293-301

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Washington D.C. Am.Soc. of Photogrammetry

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Parcellement actuel et parcellement ancien en Flandre.
Coll. Int.Paris, Archéologie Aérienne, S.E.V.P.E.N., pp. 211-225

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Land use information from airphotos.
Yearbook of Agriculture, U.S. Dept. of Agric. Washington D.C., 1958

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Une méthode pratique pour la détection aérienne des sites archéologiques.
Bulle.Soc.Préhistorique française, Paris pp. 540-546

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Bull.Soc.Préhistorique Française, Paris, 1960, pp. 72-74

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Bull.Soc.Française de Photogrammetry, nr 5, pp. 36-42

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Bull.Soc.Française de Photogrammetry nr. 5, pp. 5-8

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Journal Geogr. Dept. of Geogr., Univ. of Stellenbosch, 2, 1963, nr 3, pp. 57-61

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Amer. Antiquity, Vol. 2, pp. 102-107

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Photogrammetric Engineering, Washington, Vol. 22, 1951, pp. 754-759

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The use of basic physiographic units in air photo interpretation.
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Aerial Photography.
(Chap. 17)

THE UNIVERSITY OF ARIZONA

TUCSON

Geology Building

GEOCHRONOLOGY LABORATORIES

December 7, 1962

Miss Elizabeth K. Ralph
Department of Physics
University of Pennsylvania
Philadelphia 4, Pennsylvania

Dear Beth:

Our chat during your recent visit was short and, I fear, not very congenial; thanks to the strain of travel (I also had just returned from a long trip), power failures and a bit of boorishness in my presentation of our case. Really, I was not trying to lecture you, who are a physicist, on statistics!

However, I cannot state too strongly that, in my opinion, the case for the accuracy of carbon-14 dating is being stressed beyond its elastic limit. There are certain points of agreement:

1) Your case for an effective half life of between 5700-5800 years in agreement with the counting experiments is certainly valid for the Christian era and the early B.C. time period.

2) The discrepancy between carbon-14 dating and the Egyptian chronology is well documented by your data, that of the British Museum and also by our results.

The point of contention is basically that it appears to us that there is a serious systematic error in the carbon-14 dating method beyond 2500 B.P. Furthermore, we believe that this error is being obscured by "noise" introduced experimentally, subjective bias and a tendency to put the burden of proof on other chronologies, e.g., the Egyptian chronology, while defending the veracity of carbon-14 dating. Frankly, I am now quite skeptical of the accuracy of C-14 dating beyond 2500 B.P. Inaccuracies of as much as 25% beyond 5000 B.P., particularly beyond 10,000 B.P., would not surprise me in the least.

Although you may not agree with my point of view, let me hasten to add that your consistent and patient efforts at checking the veracity of carbon-14 dating stand as one of the most significant contributions to the method during recent years.

Best regards.

Sincerely,

Paul E. Damon
Professor of Geology
and Geochronology

PED:sg

December 20, 1962.

COPY

Prof. Paul E. Damon,
Geology Building,
The University of Arizona,
Tucson, Arizona

Dear Paul:

Many thanks for your letter, and I apologize too for my short temper during my hectic visit. Thank you also for the preprint of your excellent date list.

I have enclosed a preprint of ours and a copy of our grant report in which a few bristlecone and sequoia results are reported.

I notice that our statistical tolerances tend to be slightly greater than yours (our counters are similar in size), but the difference is probably due to the fact that we have included the uncertainty in the counting rate of our known age oak calibration samples (the average of ten or more internally consistent counts) approximately 0.08% in this year.

Something which is puzzling me at the moment are the high values of C^{13}/C^{12} ratios for sequoias. Yours seem to average about -20 and some, but not all, of ours are close to your value. Since most of our other woods which we have measured so far are closer to the expected -25 (from limestone), I am wondering what could be peculiar about sequoias. Perhaps, more measurements of both C^{14} and C^{13} values will tell us.

With best regards,

EKR:LF

Elizabeth K. Ralph

St John's College,
Cambridge, CB2 1TP

October 9th, 1974

Dr F.R. Rainey,
The University Museum,
33 and Spruce Streets,
Philadelphia 4,
Pennsylvania,
U.S.A.

Dear Fred,

Ruth and I are coming to America in early December and the main purpose of our visit is to spend a week in Williamsburg and do a television programme which is jointly sponsored by the B.B.C. and W.G.B.H. in Boston and will be used as part of the 1976 bi-centenial celebrations. This is really an exercise in historical archaeology. Noel Hume is the main person there and I am particularly anxious to have this filmed document available next year in England. We shall be in Williamsburg from December 9th to the 15th, and this is of course the time Grahame tells me that he will be in Philadelphia. We plan 5th. to be in New York on the 2nd, 3rd and 4th, and to travel on the 6th to Washington, where, to my shame, I have never been. We will be travelling from New York to Washington by train. Could we have a midday pause in Philadelphia and see you and my other friends, including Bernard? i.e. lunch on the 6th?

I am particularly anxious to talk to your lab. people and get their views on a problem which is worrying us all at the moment here, namely the date of Glozel. You will know that Morlet and co. wanted to make it late palaeolithic/early neolithic, and that most people think it is a forgery of the 1920s, but now 25 TL dates show that the material is between 700 BC and 100 AD and I am publishing these in the December number of Antiquity and will bring a copy with me to give you. But what is the answer? Can these TL dates be right? It is really a problem. Anyhow, if you are available at lunchtime on the Festival of St Nicholas (i.e. December 6th) it would be nice to talk.

I am not writing separately to Bernard but please tell him, and even if you are not there I would like to see him; but I hope to see you.

Yours ever with love from us both.

Grahame.

TO OPEN SLIT HERE

SENDER'S NAME AND ADDRESS (PLEASE SHOW YOUR POSTCODE)

Professor G.E. Daniel,
St John's College,
Cambridge, CB2 1TP,
England.

AN AIR LETTER SHOULD
NOT CONTAIN ANY ENCLOSURE;
IF IT DOES IT MAY BE SURCHARGED
OR SENT BY ORDINARY MAIL

SECOND FOLD HERE

BY AIR MAIL
AIR LETTER
PAR AVION AEROGRAMME

REMEMBER
to use the
POST CODE!

Dr F.R. Rainey,
The University Museum,
33 and Spruce Streets,
Philadelphia, 4,
Pennsylvania,

lunch 12/6

ASCA

October 15, 1974

Dear Glen:

Glad to know that you will be back in the States and of course we can set up a lunch here in the Museum on the 6th of December with Bernard Wailes and our thermoluminescence people (who are very well aware of your problem with the dating of Glozel). As you may know, we have had the same problem with the Julsrud collection in Mexico and they have been working on it for several years. However, your dates of 700 B.C. to 100 AD. should be resolved here because that is the period in TL dating of which we are very certain, although it is always possible that you get a curious kind of clay pot that is totally different and throws us off. Anyway, I am sure you will enjoy discussing this problem with Mark Han who has certainly had more experience with TL than anyone else.

Incidentally, if you and Ruth can manage it why don't you put up with us here in Philadelphia for a night or so and spend more time with us. You might even get back for the show with Grahame Clark receiving his Drexel Medal.

All the very best,

Froelich Rainey
Director

Professor G.E. Daniel
St. John's College
Cambridge, CB2 1 TP
ENGLAND

St John's College
Cambridge CB2 1TP
ENGLAND UK

31 December 1974

Dr Elizabeth Ralph
MASCA
University of Pennsylvania - Fl
University Museum
Philadelphia
Pa.19174
USA

Dear Dr Ralph,

Now that we are back in England I am writing rather belatedly to thank you for that most interesting discussion with yourself and Mark Han and Professor Michael. It was very nice to meet you again and to discuss the problems of Glozel and Julsrud. Have I your permission to send a copy of the notes you made to McKerrell and Mejdahl?

You can well imagine that the publication of the paper in Antiquity has caused a great deal of interest and discussion and I think this will go on for some while, and I have no intention of publishing anything more until the matter has been very thoroughly ventilated. I suspect that there must be some factor we do not know about that effects some samples subjected to TL dating. I am no scientist and, naturally, accept the authenticity of the TL method and its treatment in laboratories, but when one comes up against what seem to the archaeologist palpable forgeries like the Julsrud material and Glozel, one begins to wonder whether something can go wrong in one or two examples. Incidentally, has the Julsrud material and its dating ever been published? And can it be referred to?

Yours sincerely,

Glyn Daniel

SENDER'S NAME AND ADDRESS (PLEASE SHOW YOUR POSTCODE)

Professor Glyn Daniel

St John's College

Cambridge CB2 1TP ENGLAND UK

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NOT CONTAIN ANY ENCLOSURE;
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REMEMBER
to use the
POST CODE!

Dr Elizabeth Ralph
MASCA
University of Pennsylvania -
University Museum
Philadelphia
Pa.19174
USA

January 7, 1975

Professor Glyn Daniel
St. John's College
Cambridge CB2 1TP
England, UK.

Dear Professor Daniel:

Thank you for your letter of 31st December.

We are glad to give you permission to send a copy of our notes to McKerrell and Mejdahl.

The Julsrud dating has not been published and we prefer that it not be until we find out what is wrong with the dating. The material itself was published by Charles H. Hapgood, R.F.D. 3, Winchester, New Hampshire 03470. Unfortunately, we have lost our copy of the book, but I think that he would be glad to send you one.

I hope that you and Mrs. Daniel will visit us soon again.

Sincerely yours,

Elizabeth K. Ralph

LOUIS DUPREE

American Universities Field Staff
c/o U.S. Embassy Mailroom
Kabul, Afghanistan

Telephone : 21970

8 Feb. 1966

Dear Beth,

A quick request for information. UNESCO is considering putting up a C-14 lab at Kabul University for use throughout the Middle East. Could you send me an approximate figure to set up a good lab, and what the annual upkeep would be? Also, a list of labs now functioning in Asia. I hope this is not too much trouble, and all of us working out here will be grateful if we can get a lab set up. Also, would take some of the load off you.

What gives with George Dales? Is he coming out, or not? I stand ready to help in any way I can.

Best wishes to you and the Museum Staff-

Sincerely,

Louis

Louis Dupree

Ceylon -
21st Dakota
c/o Embassy
3 wks. from 21st, Afghanistan

Replied 2/10/66

February 16, 1966

Dr. Louis Dupree
American Universities Field Staff
c/o U. S. Embassy Mailroom
Kabul, Afghanistan

Dear Louis:

That is good news that UNESCO is thinking of putting up a C-14 lab in Kabul.

The cost of setting up a lab is about $25,000. A number of companies both here and in England now sell "packaged" units. The price sheets for Baird-Atomic are included. Another supplier is Johnston Laboratories, Inc., 3617 Woodland Ave., Baltimore, Md. Their complete electronic console costs $9,975, and may be more reliable than some of the others on the market because it was designed by G. J. Fergusson.

I and many others think it is preferable to build the chemical train on the spot - it is then much more flexible and easier to clean and repair. The cost is about the same.

For the running of the lab, in the beginning one physicist (or chemist) and one assistant should be sufficient. We now have approximately 3 full-time people (actually 5, but some part-time) and the annual salary expense is about $22,000 for running 2 counters. Our annual budget for current expenses and equipment replacements is as follows: (This is for one counter; our second is supported by the NSF. It would be approximately 50% more for 2 counters.)

Current Expense	
Liquid oxygen	$1,200
Dry ice	350
Chemicals, glassware, other expendable supplies, repair of vacuum pumps, etc.	1,150
Vacuum tubes and minor electronic components	550
Electronics shop, machine shop, and stockroom services	400
Telephone, printing and duplicating, and miscellaneous charges	350
	$4,000

Dr. Louis Dupree February 16, 1966

Equipment Replacement	
20 G-M counters for anti-coincidence ring	$2,000
Other electronic replacements, such as scalers, amplifiers, or high-voltage supplies	1,000
	$3,000

The only lab that I know about in Asia is run by Dr. D. Lal, Tata Institute of Fundamental Research, Colaba, Bombay 5, India. They have been in operation for more than 2 years and are doing a good job of dating.

According to Mrs. Dales, George is now in Ceylon, will be in Dakata after Feb. 21st (c/o Embassy), and plans to arrive in Afghanistan 3 weeks after the 21st.

With best regards,

Elizabeth K. Ralph

EKR/deh

Encl.

LOUIS DUPREE

American Universities Field Staff
c/o U.S. Embassy Mailroom
Kabul, Afghanistan

Telephone : 21970

1 March

Dear Beth,

Thanks loads for the information, but as usual UNESCO wants one additional bit on info: How many samples a year do you consider optimum to run through?
Sorry to bother you again, but thanks for the help.
I look forward to seeing George Dales when he arrives.
The best to the staff at the Museum, most of the best to you,

Sincerely,
Louis
Louis Dupree

March 10, 1966

Dr. Louis Dupree
American Universities Field Staff
c/o U. S. Embassy Mailroom
Kabul, Afghanistan

Dear Louis,

For optimum use of C-14 equipment one needs 2 counters because the slowest part of the process is the counting. In other words, one chemical train can keep 2 counters going.

During the past year we dated 150 samples, but made 600 co counting runs (1000 minutes each). This is because we count each sample at least twice, run background samples once a week.in each counter and "modern" controls at least once a month. In our early days, we were lucky to complete 50 samples in a year.

Hope that this is the information that UNESCO wants.

Sincerely yours,

Beth Ralph

BR/rs

June 21, 1963

Mr. W. Dyck
Isotope and Nuclear Research Laboratories
Geological Survey of Canada
601 Booth Street
Ottawa, Ontario
Canada

Dear Mr. Dyck:

We are delighted to hear that you will be visiting our laboratory. Miss Ralph is on expedition in Italy at the moment, and is expected to return in late July or early August. However, she is scheduled to attend the IUGG conference at Berkley sometime between the 15th and 30th of August. We shall be glad to see you here anytime you can come, but I'm sure Miss Ralph will want to see you and would appreciate it if you could perhaps time your arrival between August 5th and 10th.

Thank you.

Sincerely yours,

Robert Stuckenrath, jr.
Research Associate
Radiocarbon Laboratory

CANADA

DEPARTMENT OF MINES AND TECHNICAL SURVEYS

GEOLOGICAL SURVEY OF CANADA
601 Booth Street,
Ottawa, Ontario,
June 17, 1963.

Miss Elisabeth K. Ralph;
Department of Physics,
University of Pennsylvania,
Philadelphia 4, Pennsylvania.

Dear Miss Ralph:

The Geological Survey of Canada has given me permission to visit C-14 Dating Laboratories in the eastern United States. I would like to see your laboratory on Thursday August 15, 1963 if possible. But please let my coming not interfere with your plans in any way.

Should the above date not suit you kindly suggest an alternative time.

Yours sincerely,

Willy Dyck

Willy Dyck.

Saskatoon Sask.
July 15, 1963

Dear Mr. Stuckenrath:

As you can see I'm holidaying in the prairies at present, but my mail concerning my lab. visits has cut up with me nonetheless.

I'm faced with a choice of changing my schedule and not meet Mr. Krueger of Geochrone Laboratories or leave the schedule as is and not meet Miss Ralph. Since changing the whole schedule would involve more time and trouble I've chosen to forgoe the pleasure of meeting Miss Ralph in person and stick to the old schedule.

Sincerely yours

Willy Dyck
(DYCK)

Tel:215-594-8168

July 23, 1963

Dr. W. Dyck
Geological Survey of Canada
601 Booth Street
Ottawa, Ontario
Canada

Dear Dr. Dyck:

In regard to your visit here, I am writing to say that August 15th or any previous date is fine. I hope not to leave for California before August 20th.

We are looking forward to seeing you.

Sincerely yours,

EKR:lm

Elizabeth K. Ralph

Sent 2/8/74
(to Egypt)

Rainey

Dyson

Both Requests
Upgrading present
magnatometers, readouts
and sensors ($22,500)
rather than design
and construct new ones
($70,000) stop. $26,600
available in grant. Please
cable reply for order deadline.
Regards.
Dyson.

1-800-627-2211

UNIVERSITY INTRAMURAL CORRESPONDENCE

MUSEUM

MEMORANDUM

TO: Professor Robert H. Dyson, Jr., Acting Director of the University Museum

FROM: Dr. Elizabeth K. Ralph, Associate Director of MASCA

DATE: February 8, 1974

SUBJECT: Rebuilding of Precision Portable Cesium Magnetometers

In NSF Grant GS 36308 X, $20,000 was budgeted about two years ago for the purchase of two new cesium magnetometer readouts and the purchase of two new cesium sensors (from Varian Associates, the original designers and constructors of this magnetometer in 1964). The sensors, which are standard Varian products, have already been purchased for less than the amount budgeted, namely, $1900 each. However, these new sensors are slightly different (have less gain in the amplifiers) than our original ones supplied with the precision readout, and therefore have to be modified.

On February 17, 1972, Varian Associates sent me a quotation of $70,000 for one new readout and two sensors. More recently two other companies, Geo Metrics and Barringer Research Ltd. have refused to undertake the project (mostly because the sensors are patented by Varian Associates).

Therefore, Bruce Bevan and I contacted Consulting Communications Engineers, Inc. Villanova, Pa. to undertake the construction of two new readouts as well as the revision of the two new sensors. After a meeting with Raymond Kraus, President, and David G. Kilpatrick, Design Engineer, we agreed that it would be more practical to revise and upgrade our present readouts rather than design and construct completely new ones.

For this work and the revision of the sensors, CCE's quotation is $22,495 (copy attached).

In NSF Grant GS - 36308 X, we have $18,700 remaining for the purchase of equipment in the first year (11/15/72 - 11/15/73) and $7900 budgeted for the second year for equipment. Therefore, even though the cost of upgrading the cesium magnetometers is slightly greater than anticipated, we have the funds to pay for it, and we feel that it is essential that they be rebuilt before we travel with them to Iran, Egypt and other distant sites. In recent years breakdowns have been frequent and some replacement parts are now unobtainable.

We are asking for your approval for the modernization of two cesium magnetometer systems.

C. RAYMOND KRAUS
PRESIDENT

CONSULTING COMMUNICATIONS ENGINEERS, INC. ☐ 845 MOUNT MORO ROAD, VILLANOVA, PENNSYLVANIA 19085 215-525-8445

No. 1414

REPORT AND PROPOSAL

MODERNIZATION

CESIUM VAPOR MAGNETOMETERS

FOR

MASCA

UNIVERSITY MUSEUM

PHILADELPHIA, PA.

February 6, 1974

I FOREWORD

This report and proposal for design modifications on cesium vapor magnetometers has been prepared by Consulting Communications Engineers, Inc. (CCE) for the University Museum. The work carried out was in accordance with a letter proposal dated January 21, 1974 and confirming discussions between D. G. Kilpatrick and C. R. Kraus of CCE and Dr. E. K. Ralph and Mr. Bruce Bevan of the University Museum staff. Purchase Order No. 26316 dated January 28, 1974 authorized the work which entailed investigation of proposed modifications for cesium vapor magnetometers.

II OBJECTIVES AND SCOPE OF WORK

The work effort is to determine the extent and preliminary design of the proposed modifications by means of detailed testing on the existing system and an intensive review of the electronic design. The work will include a survey of the subsystems and components which are currently available for incorporation in and interfacing with the present system. The modified system must accommodate both types of magnetometers.

Improvements include a new readout system, replacement of obsolete and unreliable components and subsystems, and elimination of sources of out-of-service interruptions experienced in the field.

Estimated cost of the work, the time required to complete it and, where desirable, options to enable the Museum to choose the best arrangement are given.

III RESULTS OF INVESTIGATION

A. General

Although the findings of the study primarily concern feasibility of improving reliability and the read-out display, other improvements are recommended. This report identifies problem areas and gives approximate costs for modernizing two differential magnetometers.

Liquid-crystal displays have been recently reduced to practical hardware. As much as six months ago it would not have been practical to include liquid crystal displays in this type of instrument. There are several mature display systems to choose from, all with the advantage of maximum readability under high ambient light conditions. For low light levels, a push-button controlled lighting arrangement can be provided illuminating the display either from the front or the back. The Data Technology Corp. display seems suitable to our purposes. A final decision will not be made until the whole area has been examined.

The following Table 1 summarizes the modernization of the equipment including replacement of those subsystems that are obsolete or unreliable. This, in our opinion, is a more practical approach than a complete redesign of the entire magnetometer system and it will be cost effective.

TABLE 1

SUMMARY, MAGNETOMETER MODERNIZATION

Unit	Module or Section	Problem/Solution
SENSOR	Amplifier	Non-interchangeability of sensors (SN. 153 & 197 have low output)/Make all equivalent to SN. 90 & 93
	Voltage Reg/Lamp Osc.	(Efficient/No Change)
	Temperature Control	Possible inefficiency/Further study
BATTERY (2 Units)	Cells	Poor Regulation, Liquid/"Ni-Cad"?
	Mechanical	Fragile, Unprotected/Cases, recable
	Electrical	Choke unprotected/install fuse
READ-OUT (2 Units)	Display	Too dim in high ambient light/Liquid Crystal
	Timer	Needs faster reset/compatible with fast display
	Counters	Least Significant-Always even/new decoder
	Larmor Freq. Inputs	Reliability/See Below
	Larmor Freq. Outputs	Need Mag. B Output/add output
	Connectors	Mechanical damage/new types, relocate
	Power Pack, 5V	Efficient? Reliable? Replace?
	Circuitry Reliability	Schematics incomplete/Document, analyze
	Component Reliability	Obsolescence, wear/replace transistors and electrolytics that are under-rated, replace switches and other mechanical.
	Mechanical	Somewhat fragile (particularly external connectors)/Modify
OPERATING	Manuals	Incomplete/Update and combine with Sensor
	Spares	None/Include components (and PC boards as practical) packed for field use

B. Sensors

The basic problem is the lack of interchangeability caused by a low-level output of the Larmor frequency signal from the sensor units. We see no problem in making all units interchangeable with equivalent outputs. In analyzing the efficiency of the temperature control, there is some question as to the efficiency of using battery energy. This is particularly true at higher battery voltages.

C. Battery

Rechargeable cells should be replaced at three to five year intervals. The present silver-zinc cells have poor voltage regulation. This puts an unnecessary burden on the four voltage regulation subsystems. With recent improvements of sealed nickel-cadmium cells, improved regulation and lowered replacement costs can be achieved. There will be a small weight penalty, chiefly in providing aluminimum protective cases and quick-change connectors for individual cells.

D. Read-Out

As noted earlier, it is practical to go to a liquid crystal display at this time. We would expect no problem in reading this type of display in strong sunlight. It will, of course, be necessary to replace the decoder and driver circuitry and to interface this type of display with the present counter and timer circuitry.

The changes relating to reliability within the read-out unit are summarized in the table. The connector problem can be alleviated, in our opinion, by relocating and using newer styles of "BNC" (Amphenol) connectors and by bonding cables and connectors together with shrinkable Teflon tubing.

E. Operation and Maintenance

Operating, repair, and maintenance instructions are essential to satisfactory field use of the instruments. It is planned to prepare new instructions of such size that they can be stored within the lid or cover of the read-out unit.

F. Spares

Spares should be carefully selected and packed for field use. This is an important phase of the overall job.

IV CONTRACT MATTERS

A. The work outlined will be performed for $22,495. About $5,000 is for material and the remainder design, engineering and technician labor.

The approximate division of the work effort is as follows:

General Design Work	34%
Sensor	16%
Battery	10%
Read-out	26%
Operation Instructions and Spares	14%
	100%

B. Schedule

If work is authorized by February 20, 1974, the work will be completed before June 15, 1974.

C. Payment

Payment will be made within 30 days of completion of work.

UNIVERSITY of PENNSYLVANIA

PHILADELPHIA 19104

The Faculty of Arts and Sciences

DEPARTMENT OF PHYSICS

mummy

September 25, 1979

Professor Stephen L. Dyson
Archaeology Laboratory
Wesleyan University
Macon, Georgia 31201

Dear Professor Dyson:

Your samples for ^{14}C dating sound good, but we now have to consult a committee before accepting samples unless Martin Biddle already gave you permission.

Another problem is that we have more than a year's backlog of samples so that we cannot promise results for a year and a half.

However, we do give priority to samples that are paid for. Our charge is $200 per sample.

For the mummy, we should prefer the wrappings rather than part of the body (flesh smells awful in the combustion train). Do you know whether or not the wrappings have been impregnated with bituman? If so, we have to do a special pretreatment to remove it. We need 25 to 30 grams.

I have enclosed two information sheets. We need most of these items to consult the committee.

Sincerely yours,

Elizabeth K. Ralph

EKR:bac

Enclosures

THE UNIVERSITY MUSEUM
UNIVERSITY OF PENNSYLVANIA
THIRTY-THIRD AND SPRUCE STREETS
PHILADELPHIA, PA. 19104
CABLE ADDRESS "ANTIQUE"
TELEPHONE: EVERGREEN 6-7400
(AREA CODE 215)

6 August 1965

Miss Elizabeth K. Ralph
Associate Director
Applied Science Center for Archaeology
University Museum
Philadelphia, Pennsylvania 19104

Dear Beth:

I am having sent to you from the Bishop Museum of Honolulu seven carbon samples from excavations just completed on Nukuoro Atoll, Caroline Islands. I hope you will be able to run them along with Shutler's dates from the New Hebrides.

These are important dates for Polynesian prehistory, for they are the first from the so-called Outliers, the western fringe of settlement. Explanations of the relationships of the samples to the stratigraphy are included.

I have some personal involvement in this Nukuoro work. Vern Carroll, a former student of mine at Yale both as an undergraduate and graduate student, has been doing the ethnography there, and he has furnished good collections to the University Museum. At Carroll's suggestion Miss Davidson went to Nukuoro to dig. She and Carroll will ultimately work up the archeological data in conjunction with the ethnography. Miss Davidson is also thinking of coming to Penn. to finish her doctorate, but for the time being is working under the auspices of the Bishop Museum.

If any further clarification is needed, please write. David Crownover has my address. Best wishes.

Sincerely,
Bill
William Davenport

cc: F. Rainey, Director

ISOTOPES, Inc.

Westwood Laboratories, 50 Van Buren Place, Westwood, New Jersey 07675, Phone: 201-664-7070 TWX: 710-990-7503

July 13, 1967

Mr. William Davenport
University Museum
University of Pennsylvania
Philadelphia, Pennsylvania

Dear Mr. Davenport: W.O. #3-3143-262

We have listed below the radiocarbon ages we have determined on the samples you submitted for analysis.

Isotopes, Inc. Sample Number	Sample	$-\delta C^{14}$	Age in Years B.P.	BC/AD Date
I-2873	Guadal Canal, Poha-I 3rd Stratum, Sample 3	95 ± 11	800 ± 100	1150 AD
I-2874	Guadal Canal, Poha-I 4th Stratum, Sample 4	305 ± 9	2920 ± 110	970 BC
I-2875	Guadal Canal, Poha-I Sample 2	150 ± 11	1310 ± 100	640 AD
I-2876	Guadal Canal, Poha-I Sample 1	91 ± 10	765 ± 95	1185 AD
I-2877	Feiru II, Sample 1	84 ± 10	705 ± 90	1245 AD
I-2878	Feiru II, Sample 2	147 ± 11	1275 ± 105	675 AD
I-2879	Rate I, Sample 1	99 ± 11	835 ± 100	1115 AD
I-2880	Rate I, Sample 2	98 ± 11	830 ± 100	1120 AD
I-2881	Rate I, Sample 3	170 ± 11	1500 ± 100	450 AD
I-2882	Rate I, Sample 4	202 ± 13	1810 ± 135	140 AD

All samples were pretreated for removal of carbonates and humic acids.

If you have any questions concerning these results, please contact us. We shall be happy to help in any way possible.

We hope these results will prove helpful in your work, and we look forward to serving you again soon.

Sincerely yours,

J. Buckley
Jim Buckley

JB:kp
Enclosures

A TELEDYNE COMPANY

July 15, 1969

Dr. Nicholas C. David
B.P. 146
Garoua
Cameroon, W. Africa

Dear Dr. David:

In early May of this year we received three C-14 samples VIA Dr. Rainey, to which we assigned our P-numbers as follows:

P-1556	IB:21 (2-4m)
P-1557	IA:13 pit
P-1558	IA:4

Unfortunately, only P-1557 was large enough to date. Calculating the date with the Libby half-life which we are obliged to use for Radiocarbon, the age is

429 ± 36 B.P.; A.D. 1540

Using the 5730 half-life which we consider to be the better value the age is

442 ± 37 B.P.; A.D. 1527

Due to the fluctuations we have found in our known-age measurements in this time range there can be an additional discrepancy of ± 100 years as discussed in the enclosed reprint from Archaeometry.

Sincerely,

Barbara Lawn
Radiocarbon Laboratory

INSTITUTE OF ARCHAEOLOGY
31, GORDON SQUARE,
LONDON, W.C.I.

25th Feb. 1972

Dear Elizabeth,

Thought you might like to see details of the enclosed symposium at Oxford, which I have just received on my return here to the cold darkened strike bound Britain.

Many thanks for all your enthusiasm in Pennsylvania - it was very nice to meet you, and I am looking forward very much to coming back in September 1973 to do some more work on the Ur material.

In the meantime I hope that we can get out thermo-luminescent programme going and in a few weeks I shall have sorted out the first six sherds for Mark. This will enable us to see how they correlate to known dates.

They will be of c. 2,400 c 1550 & c 1,800. If they come out right then we know it is worth going on.

Please give my regards to Dr Maddin and to Mark.

Yours ever,

John Dayton.

the dayton museum of natural history

2629 RIDGE AVENUE, DAYTON 14, OHIO

E. J. KOESTNER
DIRECTOR

AUG 1 2 1964

Miss Elizabeth K. Ralph
Department of Physics
University of Pennsylvania
Philadelphia 4, Penna.

Dear Miss Ralph:

I am interested in obtaining some information about your institution's radiocarbon analysis. Could you please give me the amount of carbon necessary for a test and the cost of such a test.

I represent the Dayton Museum of Natural History, a non-profit organization. For the past three summers we have been conducting an archaeological excavation on an Indian village site here in Ohio and have been collecting carbon samples for analysis. We are very interested in obtaining a date for our site but lack extensive funds to have the tests made. I would greatly appreciate any information and assistance which you could give us. Thank you for your kind consideration.

Sincerely yours,

Diana C. Files

Diana C. Files (Miss)
Curator of Anthropology

November 7, 1963

Prof. Edward S. Deevey
Department of Zoology
Yale University
New Haven, Conn.

Dear Professor Deevey:

During this Radiocarbon year, we have been dating a number of series from the Arctic, Central and South America, and the Near East as well as sequoias and bristlecone pines for our methodological program. However, at this time none of these series is complete. Therefore, we do not plan to submit a Date List this year, but expect to have a large one next time.

I have enclosed a copy of my paper delivered at Berkeley in which my present thoughts are expressed. Later, at Berkeley, recent measurements of remanent magnetism made in Russia and in Japan were reported. Since these are in agreement with those of the Thelliers, the change in magnetic intensity appears to be world-wide. When the start of this change has been found, then the effect on the C-14 inventory can be recalculated more precisely.

Sincerely yours,

Elizabeth K. Ralph

EKR/deh

Encl.

January 11, 1967

Mr. James Delmege
Via Ganibaldi 88
Rome, Italy

Dear Jim:

It was good to receive your letter and to learn that you had escaped safely from Egypt. Glad to hear too that my car is fine.

Out spring plans are still indefinite because we haven't received the results of the aerial photography taken in June over the Sybanitic Plain.

On your Artena grids, I have contoured the high resistance areas. These should be the significant ones for finding walls, building foundations, etc. If they don't work out, then, perhaps, we should look at the areas with low resistance. I didn't send this off earlier for fear it would get forwarded to Egypt and get lost.

I'll probably be off somewhere when you come to the U.S.A., but, perhaps, not. When I returned in September, I was pleased to find that a neighbor had taken care of my tennis court, and since the doctor had finally given me permission to play again, we had some good games this fall. Recently, the only sport has been skiing.

With best regards,

Beth Ralph

EKR/gm

State of Delaware

Delaware Archaeological Board

R. D. 2 Box 166A, Chestnut Grove Road
AREA CODE 302 PHONES: 734-5711 EXT. 209
674-1628
DOVER, DELAWARE 19901

May 26, 1970

Dr. Elizabeth Ralph
Carbon 14 Laboratory
University of Pennsylvania
Philadelphia, Pennsylvania

Dear Dr. Ralph:

If we did not make ourselves too unwelcome during the last two summers, I would again like to request a tour of the MASCA facilities and the Carbon 14 lab for my summer class at the University of Delaware. The course will be held from June 16 to July 21 and the most advantageous date from our standpoint would be July 1.

If this is not possible, please do not hesitate to let me know. I realize the inconvenience it may cause your operations.

Sincerely yours,

Ron Thomas

Ronald A. Thomas
State Archaeologist

RAT:dr

June 1, 1970

Dr. Ronald A. Thomas
Delaware Archaeological Board
R. D. 2 Box 166A Chestnut Grove Road
Dover, Delaware 19901

Dear Dr. Thomas:

For your summer class to visit our labs, July 1 will be fine. I suggest that you bring them first to MASCA in the Museum.

Please let me know at what hour you plan to arrive and approximately how many will be in the group.

Sincerely yours,

Elizabeth K. Ralph

EKR:nb

September 30, 1966

Mme. G. Delibrias
Laboratoire du Radiocarbone
Centre National de la Recherche Scientique
9 Gif-sur-Yvette, FRANCE

Dear Mme. Delibrias:

Thank you very much for your kind hospitality on Tuesday, I was very impressed with your laboratory, and am especially envious of your beautiful equipment now that I am back here.

I found that we are having trouble again with our geiger, counters and realize that I was remiss in not asking you who manufactures yours, If I may bother you to send this information, it will be very much appreciated.

Have enclosed a few reprints.

Sincerely yours,

Beth Ralph

ER/bs

Enclosure

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"

December 8, 1967

Mr. Fred Dickson
Dimeco, Inc.
33 Walnut Road
Ocean City, New Jersey

Dear Mr. Dickson:

We have completed dating the sample of wood from your underwater find off the coast of Haiti, thought possibly to be the "Santa Maria". The apparent age of the sample is

A.D. 1738 ± 42 (5568 half-life), or
A.D. 1731 ± 43 (5730 half-life).

Using the second of these values, statistics permit us to say only that there are two chances out of three that the true radiocarbon age of the sample lies somewhere between A.D. 1688 and A.D. 1774. There is one chance in three that the age lies outside that range in either direction.

In addition, there are non-statistical problems which may cast some doubt upon the date. The first of these is the possible inclusion of materials from seawater and bottom ooze whose age is impossible to assess. The second is the fact that we suspect some sharp variations in the C-14 content of the atmosphere during this period which might tend to make dates appear too recent.

Sincerely yours,

Robert Stuckenrath, jr.
Radiocarbon Laboratory

cc: Dr. Rainey
Dr. Bass

Mrs. John Hyland Dilks
St. Georges Road
Philadelphia, Pennsylvania 19119

Sept. 15th

Dear Beth:

I trust that you will forgive the informal address but I always think of you as "Beth" and hope that you will do the same.

Sis Pell has asked me to be a sort of liaison man between the Women's Committee and the Conservation Department. The Committee is very much interested in this phase of Museum work and wants to continue its support whenever practical. We want to follow up on our past contributions and know of your needs for the future.

We understand that Miss Virginia Green is temporarily working in the Dep't but is planning to go to London for further study. Apparently she is concerned about obtaining the necessary funds. There is some thought that she might be interested in becoming a permanent member of our staff, after the completion of her courses and that she would be a very valuable addition.

The purpose of this letter is to find out what the situation is and whether or not there is anything we can do to ease the problem. Unfortunately we are not, at the moment, in a position to do anything too substantial, as we made a rather large contribution not very long ago. However, even a modest assist might be helpful and would indicate our support. More than likely this could be augmented in the not too distant future. I would very much appreciate your thoughts on the subject ... if possible, before Sept. 26th, the date of our next meeting.

I had hoped to discuss this with you in person but I have to be out of town, off and on, for the next few weeks. I trust that you have had a good summer and shall look forward to seeing you soon.

Sincerely, Peggy-

September 16, 1969

Mrs. John Hyland Dilks
St. Georges Road
Philadelphia
Pennsylvania 19119

Dear Mrs. Dilks:

Thank you for your letter in regard to Conservation matters. I am glad that you told me about Virginia Green because I hadn't known about her going to London.

I talked to Virginia and to Mrs. Pell this morning, and things seem to be arranged satisfactorily. Virginia is enrolled at the London Institute and will leave on September 21st. Fro has already given her $1000 from the Women's Committee account. This plus her own money will probably be sufficient for this year. For the second, she will need an additional $1500 to $2000, but she will have a better estimate after she has lived in London for a few months. She has been recommended very highly by Bill Coe for whom she has worked at Tikal and here. After the two years of training, she would like very much to do conservation work here. Upon her return, she plans also to finish her Ph.D. thesis in Archaeology.

This summer I visited the N.Y.U. Conservation Center and found that they are now training their students in the techniques of archaeological conservation as well as fine arts. Upon completion of two years of training, the students serve as "internists" at other institutions for a year or less. I have written to the Director, Prof. Majewski, to ask about the possibility of having an internist here this year, but I may not have a reply until late September when he returns from Sardis. Also, I do not know what salary an internist would require, but it might be possible

to pay for one for part of the year with the remaining $3500, if this idda meets with your approval.

We continue to appreciate the interest and support of the Women's Committee, and thanks are due, especially, to you and Mrs. Pell.

With best regards,

Elizabeth K. Ralph

EKR/mrb

The American Museum of Natural History Central Park West at 79th Street New York, New York 10024 (212) 873-1300

CENTENNIAL YEAR -1969

DEPARTMENT OF ANTHROPOLOGY

February 26, 1969

ASCA any ideas?

Dr. Froelich Rainey
The University Museum
Philadelphia
Pennsylvania

Dear Dr. Rainey:

Before leaving for Panama Dr. Bird left instructions that the enclosed copies of letters should be mailed to you - they are self-explanatory as you will see. The same was sent to Mr. James Buckley of Isotopes Incorporated. Dr. Bird hoped that you also might be of some help to Dr. Gonzalez's problem.

Sincerely,

Milica Dimitri
Milica Dimitri

MD:jv
Encl.

February 26, 1969

Professor Willard Libby
Department of Physics
University of California at Los Angeles
Los Angeles, California

Dear Bill:

The enclosed copy of a letter from Professor Rex Gonzalez is self-explanatory. If you have a name to suggest, i.e. the poor fellow with broken leg in Mexico, please send it to R. G.

Translation, 2nd paragraph: "I wish to ask you a favor - -. It treats with the Laboratory of Cl^4 which exists in the Museum of LaPlata. This laboratory is completely installed. It cost a sum of more than $10,000 U.S. It was constructed according to plans of the Laboratory of Upsala directed by Dr. Olson. It was constructed by an Argentine technician who worked various months with (Dr. Olson) how for diverse causes the technician who assembled it (the equipment) did not succeed in (making it work)? "ponerlo a punto nor to initiate the work of analysis. Thus we have a laboratory but without working.

Now we need a technician who can take charge. It is truly a pity that we posess a laboratory and we are not able to have radiocarbon analysis of our samples. In summary we need advice on the following:

1. Where can we find in the U.S. a specialist who has experience in Cl^4 dating with apparatus using the CO_2 method and with proportional counter.

2. Which institution N.A. might be able to collaborate in bringing said technician to Argentina for a sufficient period to make the laboratory functional and train some Argentina technician? -- will appreciate any information".

I suspect that he does not mention salary as he first wants to know if anyone is available.

It was pleasant to have even the brief phone conversation. Will let you know when I know the date I have to be in Los Angeles during April.

As ever,

Junius B. Bird

UNIVERSIDAD NACIONAL DE LA PLATA

FACULTAD DE CIENCIAS NATURALES Y MUSEO
JEFE DE LA DIVISION ARQUEOLOGIA

DIRECCION:
ADDRESS:

DR. ALBERTO REX GONZALEZ

MUSEO DE LA PLATA
La Plata, Prov. de Bs. As., Rep. Argentina

La Plata, 23 de enero de 1969.

Sr. Dr. Junius Bird.
American Museum of Natural History
Central Park West.
New York City- N.Y.
E.E.U.U.

Muy estimado Junius:

Lamenté mucho que no pudieras comunicarte con Cardich por teléfono. El teléfono que Cardich me había dado y que yo tenía en mi libreta era de la casa de sus suegros, pues sucede de que debido a las dificultades que aquí existen en obtener una línea telefónica, Cardich no tiene teléfono en su casa y se comunica por intermedio del teléfono de sus suegros. Yo había olvidado por completo este detalle que recién advertí varios días después cuando le pregunté a Cardich si se había podido comunicar contigo . En fin lamento lo ocurrido y espero que el mismo Cardich te haya explicado por carta lo ocurrido.

Desearía pedirte un favor y un consejo que realmente te agradeceré. Se trata del Laboratorio de Carbono 14 que existe en el Museo de La Plata. Este laboratorio está completamente montado. Costó una suma de más de 10.000 U$S dollars. Fue construído de acuerdo con los planos del Laboratorio de Upsala que dirige la Dra. Olson. Lo

UNIVERSIDAD NACIONAL DE LA PLATA

FACULTAD DE CIENCIAS NATURALES Y MUSEO
JEFE DE LA DIVISION ARQUEOLOGIA

DIRECCION:
ADDRESS:

DR. ALBERTO REX GONZALEZ

MUSEO DE LA PLATA
La Plata, Prov. de Bs. As., Rep. Argentina

construyó un técnico argentino que trabajó varios meses con dicha investigadora. Ahora bien, por causas diversas, el técnico que lo montó no logró ponerlo a punto ni iniciar los trabajos de análisis . Por lo tanto tenemos el laboratorio pero sin funcionar.

Actualmente carecemos de un técnico que se haga cargo del mismo. Es una verdadera lástima que poseyendo el laboratorio no podamos tener análisis radiocarbónicos de nuestras muestras. En resumen necesitamos nos aconsejes sobre lo siguiente:

1.- Donde podríamos encontrar en E.E.U.U. un especialista que tenga práctica en fechados de Carbobo 14, especialmente con aparatos que usan el método de Dióxido de Carbono y poseen contador proporcional.

2.- Qué institución norteamericana podría colaborar en traer dicho técnico a la Argentina por un período suficiente para poner el laboratorio en funcionamiento y entrenar a algún técnico argentino ?

Créeme que te quedaré muy agradecido por tu informe y si logramos hacer funcionar el laboratorio será una gran contribución a nuestra disciplina.

Un saludo muy cordial de

Alberto Rex González

January 26, 1968

Dear Ding:

Your idea of meeting in Washington with people from the Smithsonian and the Park Service sounds very good to me, and I see that Ed Bacon also approves. Certainly I think Dillon and Frank Taylor ought to sit in on this and you will probably know who it is at the Park Service. I will be here or at least in and out until about the 20th of February, so if we can arrange it early in February that would be fine with me.

All the best.

Sincerely,

Froelich Rainey
Director

Mr. Ewen C. Dingwall
1200 North Nash Street
Arlington, Virginia 22209

FGR/ sjc
cc: Mr. Edmund N. Bacon

January 3, 1967

Dr. Richard R. Doell
Branch of Theoretical Geophysics
345 Middlefield Road
Menlo Park, California 94025

Dear Dr. Doell:

The meetings in Spoleto were stimulating and I am glad to hear that you plan to continue with TL in spite of the uncertainties.

The silicone oil which we use is "Duxe Silicone" 500 Centistokes obtained from Duxe Products, P. O. Box 1192, Cincinnati 1, Ohio. Our silk screen technique is described briefly on page 2 of the enclosed reprint. I have enclosed also a sample mounted on the Al foil and I hope that it arrives intact.

A few weeks ago, I went to Palo Alto to talk with Varian Associates about magnetometer plans, etc. and they seemed very much interested in designing and making TL equipment that would serve both for our type of requirement and for sensitive dorsimetry measurements. I don't know at this time whether or not they will pursue this, but if they do and you want to save yourself some trouble, contact Lee Langan (in marketing) or Jim Arnold (physicist), both at 611 Hansen Way, phone 415-326-4000.

I hope that the New Year will "glow" well for you.

Sincerely yours,

Elizabeth K. Ralph

EKR:rs

enclosures

April 28, 1975

Dr. Lambert Dolphin
Stanford Research Institute
Menlo Park, California 94025

Re: Proposal ERC 75-102

Dear Lambert,

Many thanks for your letter of April 21st and for the invoice for $3500. The latter, I shall process right away.

We are happy to accept the terms of your proposal no. ERC 75-102.

Henry is planning to leave about May 21st and expects to arrive in Bishop on June 9th or 10th. He is still waiting to hear from the Bureau of Land Management, but if all goes well, he hopes that you can join him about June 15th.

With best regards,

Elizabeth K. Ralph

EKR:jb

April 7, 1975

Dr. Lambert Dolphin, Senior Physicist
Radio Physics Laboratory
Stanford Research Institute
Menlo Park, California 94025

Dear Lambert,

Thank you for your letter of March 11th. We, too, enjoyed your visit, but I regret that the Hilton was so disorganized.

I have just budgeted $3,500 for SRI's participation with the soil-penetrating radar in the White Mountains this spring or summer. Could you please send me a bill so that we can transfer the funds? The funds will be coming from an account called SDUS-NSF-DES-74-22233. Please send it to this address rather than to the Museum.

I hope that $3,500 will be sufficient. Henry Michael is looking forward to the field work.

With best regards,

Elizabeth K. Ralph

EKR/dh
encl.

STANFORD RESEARCH INSTITUTE
MENLO PARK, CALIFORNIA 94025
(415) 326-6200

April 21, 1975

Dr. Elizabeth K. Ralph
Department of Physics, DRL/EI
University of Pennsylvania
Philadelphia, Pennsylvania 19174

Re: Proposal ERC 75-102

Dear Beth,

It will be a great pleasure to apply our underground radars and personal services to the problem of locating Bristlecone Pine stumps buried in alluvial fans in the White Mountains during late May and early June of this year, as we discussed recently in your office. We look forward to working with Henry Michael on this project. It is our plan to make two separate attempts at radar location of buried logs during different phases of Henry's excavation there.

Our participation is to be on a cost plus fixed fee basis not to exceed a total of $3500. An invoice is enclosed per your request.

This research project will be established at the Institute on receipt of a letter accepting the proposal.

This proposal will remain in effect until 31 July 1975; however, the Institute will be pleased to consider an extension if requested.

Respectfully submitted,

Lambert Dolphin

Lambert Dolphin
Senior Physicist
Radio Physics Laboratory

Encl.

LD:hd

Approved:

R. L. Leadabrand

R. L. Leadabrand, Executive Director
Electronics and Radio Sciences Division

April 19, 1962

Mr. Paul S. Donham
612 College Avenue
Tempe, Arizona

Dear Sir:

In answer to your letter of March 20th, the publications desk of the University Museum informs me that Evidence of Early Man in North America is now out of print; nor is any second printing contemplated. The Library of the University Museum, of course, carries a copy, and assures me that one could most likely be found in university libraries of the Southwest.

This Museum publishes no other material specifically correlating stratigraphy and Carbon-14 dates for earl man sites in North America. And, aside from laboriously combing American Antiquity and Radiocarbon in an attempt to do the job piecemeal, I have no constructive siggestions.

I am sorry not to have been more help.

Very truly yours,

Robert Stuckenrath, jr.
Research Associate
Carbon-14 Laboratory

March 20, 1962

Museum,
University of Pennsylvania,
Philadelphia, Pennsylvania.

Dear Sirs:

A 1941 printing of Southwest Archaeology refers to Evidence of Early Man In North America which appeared in the Nov. 2, 1935 Museum Journal, Vol. 24. O.P.

I will greatly appreciate any information on obtaining reprints of this and other papers on early man during the first 10,000 years b. c.

I am particularly in need of stratification reports of excavations and their correlation with Carbon 14 tests dealing with the period from 6000 b. c. to 2000 b. c.

Sincerely yours

Paul S. Donham

Paul S. Donham
612 College ave.,
Tempe, Arizona.

UNIVERSITY of PENNSYLVANIA
PHILADELPHIA 19104

Department of Geology

January 18, 1968

Professor J. J. Donner
Department of Geology and Paleontology
University of Helsinki
Snellmaninkatu 5
Helsinki 17, Finland

Dear Professor Donner:

I am pleased to report that Miss Elizabeth Ralph has fully recovered from her operation, and that our Carbon-14 Laboratory is back on even keel again. We shall be glad to begin collaboration with your research student. The present backlog of the Laboratory is solid until about June, 1968, but after that date Miss Ralph should be able to work your samples in. For that reason we are sending you, enclosed, sample sheets to be made out for each sample with the requisite information. You may send the samples any time.

At the same time I wonder whether this project may not lead to other projects which may warrant our going to the Government for support. This is essentially an internal affair within the United States, but we would like a clear statement of about 200 to 300 words from you describing the purpose and interests of the project you have in mind, and stating its importance from a general scientific point of view. We would then use this statement, together with similar statements, in an application to the National Science Foundation for support of the Laboratory. As before, there would be no charge to you.

We plan to submit a proposal to the National Science Foundation within the next two months, so if you could furnish us with this statement within a month or so, that would be soon enough.

I look forward to an interesting collaboration with your University.

Sincerely,

Henry Faul
(Chairman)

mf
cc: E.K. Ralph
F. Rainey

December 4, 1969

Dear Dr. Dorley:

Please forgive my delay in sending you Watanabe's address. It is as follows:

Prof. Naotune Watanabe
Dept. of Anthropology, Faculty of Science
University of Tokyo
Metofugi-cho
Bunkyo-ku
Tokyo, Japan

The article which contains the C-14 dates for the Jomon and other periods is entitled "Chronological Background for Studies on Micro-evolution and Population History in Japan," J. of the Faculty of Science, Univ. of Tokyo, Sec. V, Vol. III, Part 4, pp. 267-277 (March 31, 1969).

I enjoyed meeting you in Milwaukee.

Sincerely yours,

Elizabeth K. Ralph

Dr. David L. Dorley
Center for Climatic Research
Department of Meteorology
University of Wisconsin

May 13, 1964

Miss Dayle Doyal
2882 De Lowe Drive
East Point, Georgia

Dear Miss Doyal:

Thank you for your letter of April 28th. Regarding the reference standards, we have been using tree-ring dated sections of oak trees since 1952. The standard currently in use is a white oak blown down in the local hurricane of 1950; we use tree-ring dated sections in the A.D. 1800-1850 range to avoid the Suess effect. The extrapolated "zero age" counting rate for these samples is 95 percent of the NBS oxalic acid standard, so we have continued to use the oak, thereby avoiding the possible fractionation in the "wet" conversion of the NBS standard.

The "zero age" counting rate of the oak is now 31.851 c/m, with a background on anthracite coal of 9.704 c/m. This is in terms of rather large counters, about 7 and 8 liters capacity.

On the matter of voltage fluctuations, we have not been bothered, perhaps because of the installation of isolation transformers between the incoming city/departmental lines and our own equipment. As an additional precaution, we have installed magnetic starting relays to prevent excessive loads on the high voltage supplies in the event of a power failure and return. The delay in these relays is something of the order of three to five seconds.

I hope all this has been of some value. If we can be of any further help, please let us know.

Best of luck.

Sincerely yours,

Robert Stuckenrath, jr.
Radiocarbon Laboratory

2282 DeLave Dr.
East Point, Ga.
April 28, 1964

Dear Miss Ralph,

After a lecture here, at Georgia State College, I met Professor Cotter from the University of Pennsylvania, who suggested that you might be able to answer some of my questions about carbon dating.

I have set up a scintillation counter without an anti-coincidence counter and with a background of 0.25 counts/min. Though I've gotten a few reasonable dates on charcoal samples, I'm still a little doubtful of my standards, oxalic acid. Do you use oxalic acid or wood, and what sort of count rate do you obtain?

Secondly, I'm having trouble with a peak drift on a beta spectrometer; since we use commercial power, I suspect that this is due to voltage fluctuations and probably affects the scintillation equipment as well. Have you noticed voltage fluctuations or other difficulties with your apparatus? I certainly would appreciate any suggestions you could make.

Sincerely,

Dayle Doyal

P.S. I know my script is terrible, my address is:

Miss Dayle Doyal
2282 De Lowe Dr.
East Point, GA.

Perhaps you can decipher the printing.

FRANKLIN and MARSHALL COLLEGE
LANCASTER, PENNSYLVANIA 17604

NORTH MUSEUM

February 9, 1977

Dr. Elizabeth K. Ralph
University Museum
University of Pennsylvania
Philadelphia, Pennsylvania 19104

Dear Dr. Ralph:

Dr. Fred Kinsey has a project here to establish the dates of archeological pottery by thermoluminescent methods. I am working with him on this project and he has suggested that I write you for some information. I have read some of your publications in this field and would particularly like to know the details of alpha counting, such as sample size, average counts per hour needed for satisfactory measurements, type of equipment, and the like. I would be glad to receive reprints of or references to your recent publications.

We have here at the College people who can measure thermoluminescence and beta radiation, but no one here measures alpha radiation.

We will greatly appreciate your help to us on this project. Dr. Kinsey joins me in sending our best regards.

Sincerely yours,

Lawrence H. Dunlap

Lawrence H. Dunlap
Assistant Curator,
Geology and
Mineralogy

LHD/sf
cc: W. Fred Kinsey

February 18, 1977

Dr. Lawrence H. Dunlap
Assistant Curator
Geology and Mineralogy
Franklin and Marshal College
Lancaster, Pennaylvania 17604

Dear Dr. Dunlap:

For alpha counting, one needs only a photomultiplier and associated electronic circuits. The tube, such as Type 6292 shown on the enclosed sketch, should have a flat face. The only special component is the ZnS screen which is a recessed disc of plexiglas on one side of which a uniform thin layer of ZnS is coated. This is held in place by the thinnest coating possible of Krylon "Crystal Clear." (We fill the plexiglas disc with about 3 mg. of pulverized pottery to give an "infinitely" thick layer. Typical alpha counting rates are 20 per hour)

Even though the range of alphas in clays is short (about 22), they are energetic so that high settings of the discriminators can be used to minimize the background.

I am sorry that we do not have recent publications with more details of the apparatus.

Sincerely yours,

Elizabeth K. Ralph

FRANKLIN and MARSHALL COLLEGE
LANCASTER, PENNSYLVANIA 17604

NORTH MUSEUM

March 1, 1977

Dr. Elizabeth K. Ralph
The University Museum
University of Pennsylvania
Philadelphia, Pennsylvania 19104

Dear Dr. Ralph:

Thanks very much for your letter of February 18th and the diagram with it. I have given them and a sample of pottery supplied by Dr. Kinsey to Dr. Paul McInerney of Millersville State College who will use his equipment and measure the alpha counts. When we get some information, or need more help, which ever comes first, I will write again. It might be practical for us to come to Philadelphia and discuss the work with you and members of your staff involved in the dating perhaps later this spring or next fall. We greatly appreciate your help to us in this work.

Sincerely yours,

Lawrence H. Dunlap

Lawrence H. Dunlap
Assistant Curator
Geology and
Mineralogy

LHD/sf
cc: Dr. Kinsey

FRANKLIN and MARSHALL COLLEGE
LANCASTER, PENNSYLVANIA 17604

NORTH MUSEUM

Not Tuesday

November 28, 1979

Dr. E. K. Ralph
University Museum
University of Pennsylvania
Philadelphia, Pennsylvania 19104

Dear Dr. Ralph:

Dr. W. Fred Kinsey, director of the North Museum and professor of anthropology at Franklin and Marshall College became interested some time ago in the dating of American Indian pottery by thermoluminescence. He remembered meeting you several years ago, and your work using thermoluminescence for that purpose. He asked me to develop a project toward that end and for the past several months Mr. Imre Barsy, a physicist, has been working, under my general direction, to use that method. We have in the Physics Department at the College a Harshaw Model 2000 A detector and 2000 B integrating piccoammeter, which records the glow curve and measures the area under it. We have been using a variety of crystals from Harshaw to familiarize ourselves with the operation and its reproducibility. So far we have had rather limited success and are not satisfied with our results.

In view of this situation we would like to come to Philadelphia to visit you and discuss some of the techniques and our results and see if we can improve ours. I understand that Dr. S. J. Fleming, formerly engaged in this sort of work at Oxford, is now at the University. If it is convenient we would like to talk with him also.

I will phone you in a week or so to see if we can arrange a time for Mr. Barsy and myself to come to visit you about this work. We will certainly appreciate the chance to tell you what we have been doing and to hear your comments. Dr. Kinsey is on leave at present but I know he too will appreciate your willingness to visit with us.

With best regards.

Sincerely yours,

Lawrence H. Dunlap

Lawrence H. Dunlap, Ph.D.
Associate Curator,
Geology and Mineralogy

LHD/sf
cc: J. A. Andrew
I. J. Barsy

LOUIS DUPREE

American Universities Field Staff
c/o U.S. Embassy Mailroom
Kabul, Afghanistan

Telephone : 21970

8 Feb. 1966

Dear Beth,

A quick request for information. UNESCO is considering putting up a C-14 lab at Kabul University for use throughout the Middle East. Could you send me an approximate figure to set up a good lab, and what the annual upkeep would be? Also, a list of labs now functioning in Asia. I hope this is not too much trouble, and all of us working out here will be grateful if we can get a lab set up. Also, would take some of the load off you.

What gives with George Dales? Is he coming out, or not? I stand ready to help in any way I can.

Best wishes to you and the Museum Staff-

Sincerely,

Louis

Louis Dupree

Ceylon -
21st Dakota
c/o Embassy
3 wks. from 21st, Afghanistan

Replied 2/10/66

February 16, 1966

Dr. Louis Dupree
American Universities Field Staff
c/o U. S. Embassy Mailroom
Kabul, Afghanistan

Dear Louis:

That is good news that UNESCO is thinking of putting up a C-14 lab in Kabul.

The cost of setting up a lab is about $25,000. A number of companies both here and in England now sell "packaged" units. The price sheets for Baird-Atomic are included. Another supplier is Johnston Laboratories, Inc., 3617 Woodland Ave., Baltimore, Md. Their complete electronic console costs $9,975, and may be more reliable than some of the others on the market because it was designed by G. J. Fergusson.

I and many others think it is preferable to build the chemical train on the spot - it is then much more flexible and easier to clean and repair. The cost is about the same.

For the running of the lab, in the beginning one physicist (or chemist) and one assistant should be sufficient. We now have approximately 3 full-time people (actually 5, but some part-time) and the annual salary expense is about $22,000 for running 2 counters. Our annual budget for current expenses and equipment replacements is as follows: (This is for one counter; our second is supported by the NSF. It would be approximately 50% more for 2 counters.)

Current Expense	
Liquid oxygen	$1,200
Dry ice	350
Chemicals, glassware, other expendable supplies, repair of vacuum pumps, etc.	1,150
Vacuum tubes and minor electronic components	550
Electronics shop, machine shop, and stockroom services	400
Telephone, printing and duplicating, and miscellaneous charges	350
	$4,000

Dr. Louis Dupree February 16, 1966

Equipment Replacement	
20 G-M counters for anti-coincidence ring	$2,000
Other electronic replacements, such as scalers, amplifiers, or high-voltage supplies	1,000
	$3,000

The only lab that I know about in Asia is run by Dr. D. Lal, Tata Institute of Fundamental Research, Colaba, Bombay 5, India. They have been in operation for more than 2 years and are doing a good job of dating.

According to Mrs. Dales, George is now in Ceylon, will be in Dakata after Feb. 21st (c/o Embassy), and plans to arrive in Afghanistan 3 weeks after the 21st.

With best regards,

Elizabeth K. Ralph

EKR/deh

Encl.

LOUIS DUPREE

American Universities Field Staff
c/o U.S. Embassy Mailroom
Kabul, Afghanistan

Telephone : 21970

1 March

Dear Beth,

Thanks loads for the information, but as usual UNESCO wants one additional bit on info: How many samples a year do you consider optimum to run through?
Sorry to bother you again, but thanks for the help.
I look forward to seeing George Dales when he arrives.
The best to the staff at the Museum, most of the best to you,

Sincerely,
Louis
Louis Dupree

March 10, 1966

Dr. Louis Dupree
American Universities Field Staff
c/o U. S. Embassy Mailroom
Kabul, Afghanistan

Dear Louis,

For optimum use of C-14 equipment one needs 2 counters because the slowest part of the process is the counting. In other words, one chemical train can keep 2 counters going.

During the past year we dated 150 samples, but made 600 co counting runs (1000 minutes each). This is because we count each sample at least twice, run background samples once a week.in each counter and "modern" controls at least once a month. In our early days, we were lucky to complete 50 samples in a year.

Hope that this is the information that UNESCO wants.

Sincerely yours,

Beth Ralph

BR/rs

June 21, 1963

Mr. W. Dyck
Isotope and Nuclear Research Laboratories
Geological Survey of Canada
601 Booth Street
Ottawa, Ontario
Canada

Dear Mr. Dyck:

We are delighted to hear that you will be visiting our laboratory. Miss Ralph is on expedition in Italy at the moment, and is expected to return in late July or early August. However, she is scheduled to attend the IUGG conference at Berkley sometime between the 15th and 30th of August. We shall be glad to see you here anytime you can come, but I'm sure Miss Ralph will want to see you and would appreciate it if you could perhaps time your arrival between August 5th and 10th.

Thank you.

Sincerely yours,

Robert Stuckenrath, jr.
Research Associate
Radiocarbon Laboratory

CANADA

DEPARTMENT OF MINES AND TECHNICAL SURVEYS

GEOLOGICAL SURVEY OF CANADA
601 Booth Street,
Ottawa, Ontario,
June 17, 1963.

Miss Elisabeth K. Ralph;
Department of Physics,
University of Pennsylvania,
Philadelphia 4, Pennsylvania.

Dear Miss Ralph:

The Geological Survey of Canada has given me permission to visit C-14 Dating Laboratories in the eastern United States. I would like to see your laboratory on Thursday August 15, 1963 if possible. But please let my coming not interfere with your plans in any way.

Should the above date not suit you kindly suggest an alternative time.

Yours sincerely,

Willy Dyck

Willy Dyck.

Saskatoon Sask.
July 15, 1963

Dear Mr. Stuckenrath:

As you can see I'm holidaying in the prairies at present, but my mail concerning my lab. visits has cut up with me nonetheless.

I'm faced with a choice of changing my schedule and not meet Mr. Krueger of Geochrone Laboratories or leave the schedule as is and not meet Miss Ralph. Since changing the whole schedule would involve more time and trouble I've chosen to forgoe the pleasure of meeting Miss Ralph in person and stick to the old schedule.

Sincerely yours

Willy Dyck
(DYCK)

Tel:215-594-8168

July 23, 1963

Dr. W. Dyck
Geological Survey of Canada
601 Booth Street
Ottawa, Ontario
Canada

Dear Dr. Dyck:

In regard to your visit here, I am writing to say that August 15th or any previous date is fine. I hope not to leave for California before August 20th.

We are looking forward to seeing you.

Sincerely yours,

EKR:lm

Elizabeth K. Ralph

Sent 2/8/74
(to Egypt)

Rainey

Dyson

Both Requests
Upgrading present
magnatometers, readouts
and sensors ($22,500)
rather than design
and construct new ones
($70,000) stop. $26,600
available in grant. Please
cable reply for order deadline.
Regards.
Dyson.

1-800-627-2211

UNIVERSITY INTRAMURAL CORRESPONDENCE

MUSEUM

MEMORANDUM

TO: Professor Robert H. Dyson, Jr., Acting Director of the University Museum

FROM: Dr. Elizabeth K. Ralph, Associate Director of MASCA

DATE: February 8, 1974

SUBJECT: Rebuilding of Precision Portable Cesium Magnetometers

In NSF Grant GS 36308 X, $20,000 was budgeted about two years ago for the purchase of two new cesium magnetometer readouts and the purchase of two new cesium sensors (from Varian Associates, the original designers and constructors of this magnetometer in 1964). The sensors, which are standard Varian products, have already been purchased for less than the amount budgeted, namely, $1900 each. However, these new sensors are slightly different (have less gain in the amplifiers) than our original ones supplied with the precision readout, and therefore have to be modified.

On February 17, 1972, Varian Associates sent me a quotation of $70,000 for one new readout and two sensors. More recently two other companies, Geo Metrics and Barringer Research Ltd. have refused to undertake the project (mostly because the sensors are patented by Varian Associates).

Therefore, Bruce Bevan and I contacted Consulting Communications Engineers, Inc. Villanova, Pa. to undertake the construction of two new readouts as well as the revision of the two new sensors. After a meeting with Raymond Kraus, President, and David G. Kilpatrick, Design Engineer, we agreed that it would be more practical to revise and upgrade our present readouts rather than design and construct completely new ones.

For this work and the revision of the sensors, CCE's quotation is $22,495 (copy attached).

In NSF Grant GS - 36308 X, we have $18,700 remaining for the purchase of equipment in the first year (11/15/72 - 11/15/73) and $7900 budgeted for the second year for equipment. Therefore, even though the cost of upgrading the cesium magnetometers is slightly greater than anticipated, we have the funds to pay for it, and we feel that it is essential that they be rebuilt before we travel with them to Iran, Egypt and other distant sites. In recent years breakdowns have been frequent and some replacement parts are now unobtainable.

We are asking for your approval for the modernization of two cesium magnetometer systems.

C. RAYMOND KRAUS
PRESIDENT

CONSULTING COMMUNICATIONS ENGINEERS, INC. ☐ 845 MOUNT MORO ROAD, VILLANOVA, PENNSYLVANIA 19085 215-525-8445

No. 1414

REPORT AND PROPOSAL

MODERNIZATION

CESIUM VAPOR MAGNETOMETERS

FOR

MASCA

UNIVERSITY MUSEUM

PHILADELPHIA, PA.

February 6, 1974

I FOREWORD

This report and proposal for design modifications on cesium vapor magnetometers has been prepared by Consulting Communications Engineers, Inc. (CCE) for the University Museum. The work carried out was in accordance with a letter proposal dated January 21, 1974 and confirming discussions between D. G. Kilpatrick and C. R. Kraus of CCE and Dr. E. K. Ralph and Mr. Bruce Bevan of the University Museum staff. Purchase Order No. 26316 dated January 28, 1974 authorized the work which entailed investigation of proposed modifications for cesium vapor magnetometers.

II OBJECTIVES AND SCOPE OF WORK

The work effort is to determine the extent and preliminary design of the proposed modifications by means of detailed testing on the existing system and an intensive review of the electronic design. The work will include a survey of the subsystems and components which are currently available for incorporation in and interfacing with the present system. The modified system must accommodate both types of magnetometers.

Improvements include a new readout system, replacement of obsolete and unreliable components and subsystems, and elimination of sources of out-of-service interruptions experienced in the field.

Estimated cost of the work, the time required to complete it and, where desirable, options to enable the Museum to choose the best arrangement are given.

III RESULTS OF INVESTIGATION

A. General

Although the findings of the study primarily concern feasibility of improving reliability and the read-out display, other improvements are recommended. This report identifies problem areas and gives approximate costs for modernizing two differential magnetometers.

Liquid-crystal displays have been recently reduced to practical hardware. As much as six months ago it would not have been practical to include liquid crystal displays in this type of instrument. There are several mature display systems to choose from, all with the advantage of maximum readability under high ambient light conditions. For low light levels, a push-button controlled lighting arrangement can be provided illuminating the display either from the front or the back. The Data Technology Corp. display seems suitable to our purposes. A final decision will not be made until the whole area has been examined.

The following Table 1 summarizes the modernization of the equipment including replacement of those subsystems that are obsolete or unreliable. This, in our opinion, is a more practical approach than a complete redesign of the entire magnetometer system and it will be cost effective.

TABLE 1

SUMMARY, MAGNETOMETER MODERNIZATION

Unit	Module or Section	Problem/Solution
SENSOR	Amplifier	Non-interchangeability of sensors (SN. 153 & 197 have low output)/Make all equivalent to SN. 90 & 93
	Voltage Reg/Lamp Osc.	(Efficient/No Change)
	Temperature Control	Possible inefficiency/Further study
BATTERY (2 Units)	Cells	Poor Regulation, Liquid/"Ni-Cad"?
	Mechanical	Fragile, Unprotected/Cases, recable
	Electrical	Choke unprotected/install fuse
READ-OUT (2 Units)	Display	Too dim in high ambient light/Liquid Crystal
	Timer	Needs faster reset/compatible with fast display
	Counters	Least Significant-Always even/new decoder
	Larmor Freq. Inputs	Reliability/See Below
	Larmor Freq. Outputs	Need Mag. B Output/add output
	Connectors	Mechanical damage/new types, relocate
	Power Pack, 5V	Efficient? Reliable? Replace?
	Circuitry Reliability	Schematics incomplete/Document, analyze
	Component Reliability	Obsolescence, wear/replace transistors and electrolytics that are under-rated, replace switches and other mechanical.
	Mechanical	Somewhat fragile (particularly external connectors)/Modify
OPERATING	Manuals	Incomplete/Update and combine with Sensor
	Spares	None/Include components (and PC boards as practical) packed for field use

B. Sensors

The basic problem is the lack of interchangeability caused by a low-level output of the Larmor frequency signal from the sensor units. We see no problem in making all units interchangeable with equivalent outputs. In analyzing the efficiency of the temperature control, there is some question as to the efficiency of using battery energy. This is particularly true at higher battery voltages.

C. Battery

Rechargeable cells should be replaced at three to five year intervals. The present silver-zinc cells have poor voltage regulation. This puts an unnecessary burden on the four voltage regulation subsystems. With recent improvements of sealed nickel-cadmium cells, improved regulation and lowered replacement costs can be achieved. There will be a small weight penalty, chiefly in providing aluminimum protective cases and quick-change connectors for individual cells.

D. Read-Out

As noted earlier, it is practical to go to a liquid crystal display at this time. We would expect no problem in reading this type of display in strong sunlight. It will, of course, be necessary to replace the decoder and driver circuitry and to interface this type of display with the present counter and timer circuitry.

The changes relating to reliability within the read-out unit are summarized in the table. The connector problem can be alleviated, in our opinion, by relocating and using newer styles of "BNC" (Amphenol) connectors and by bonding cables and connectors together with shrinkable Teflon tubing.

E. Operation and Maintenance

Operating, repair, and maintenance instructions are essential to satisfactory field use of the instruments. It is planned to prepare new instructions of such size that they can be stored within the lid or cover of the read-out unit.

F. Spares

Spares should be carefully selected and packed for field use. This is an important phase of the overall job.

IV CONTRACT MATTERS

A. The work outlined will be performed for $22,495. About $5,000 is for material and the remainder design, engineering and technician labor.

The approximate division of the work effort is as follows:

General Design Work	34%
Sensor	16%
Battery	10%
Read-out	26%
Operation Instructions and Spares	14%
	100%

B. Schedule

If work is authorized by February 20, 1974, the work will be completed before June 15, 1974.

C. Payment

Payment will be made within 30 days of completion of work.

UNIVERSITY of PENNSYLVANIA

PHILADELPHIA 19104

The Faculty of Arts and Sciences

DEPARTMENT OF PHYSICS

mummy

September 25, 1979

Professor Stephen L. Dyson
Archaeology Laboratory
Wesleyan University
Macon, Georgia 31201

Dear Professor Dyson:

Your samples for ^{14}C dating sound good, but we now have to consult a committee before accepting samples unless Martin Biddle already gave you permission.

Another problem is that we have more than a year's backlog of samples so that we cannot promise results for a year and a half.

However, we do give priority to samples that are paid for. Our charge is $200 per sample.

For the mummy, we should prefer the wrappings rather than part of the body (flesh smells awful in the combustion train). Do you know whether or not the wrappings have been impregnated with bituman? If so, we have to do a special pretreatment to remove it. We need 25 to 30 grams.

I have enclosed two information sheets. We need most of these items to consult the committee.

Sincerely yours,

Elizabeth K. Ralph

EKR:bac

Enclosures