

Beth

Thought we'd forward this on
to you in case you need anyone
with his qualifications.

How was Yugoslavia?
Greetings from us both.

Ann

VIRGINIA POLYTECHNIC INSTITUTE
COLLEGE OF ARTS AND SCIENCES
BLACKSBURG, VIRGINIA 24061

DEPARTMENT OF CHEMISTRY

July, 3, 1969

Dr. G. Bass
University Museum
University of Pennsylvania
Philadelphia, Pa.

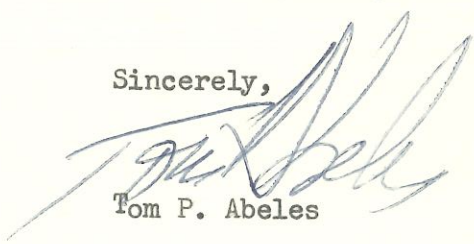
Dear Dr. Bass:

I am looking for a permanent position starting preferably in January 1970 but I am available any time after September 1, 1969. At the present time I have a post doctoral position in chemistry but I have a strong interest in archaeology and Mr. W. Feinberg suggested that I write directly to you.

Before I obtained my Ph. D. in chemistry I was doing neutron activation analysis on archaeological artifacts and I would very much like to return to the general area of "scientific archaeology". Since my hobby is SCUBA I thought perhaps that I might be able to combine my avocation with my vocation in the general area of underwater archaeology.

I am enclosing a short resume and would be more than happy to supply you with any additional information you might need to reach a decision.

Sincerely,



Tom P. Abeles

RESUME

Personal Data

Name: Abeles, Tom Peter
Permanent Address: 2103 Sherwood
Louisville, Kentucky 40205
Phone: 502-451-3418

Present Address: 850 Giles Road
Blacksburg, Virginia 24060
Phone: 703-552-~~2008~~ 4655

Office Address: Department of Chemistry
Virginia Polytechnic Institute
Blacksburg, Virginia 24061
Phone: 703-552-6688

Date of Birth: February 25, 1941
Place of Birth: Louisville, Kentucky
Marital Status: ~~Single~~ Married
Military Status: 1-0
Physical Limitations: None

Interests and Activities:

Activities - College-Student union governing board, dormitory councils, student paper; chairman of Americans for Reappraisal of Our Far Eastern Policy (ARFEP)
Science Advisor and Instructor for Ann Arbor Tutorial (local "Head Start" type program)

Interests - SCUBA Diving, Flying, Amateur Radio, Hiking

Education

Dates Attended

Wilmington College, Wilmington, Ohio, B.S. Chemistry	9/59-6/63
University of Michigan, Ann Arbor, Michigan (Anthropology)	Intermittent
University of Louisville, Louisville, Kentucky, Ph. D. Chemistry	2/66-8/68

Awards and Honors

National Merit Scholar (W.C.); Chi Beta Phi (Science Honorary); Phi Lambda Upsilon (Chemistry Honorary); Sigma Xi (Science Honorary); NDEA Traineeship (Univ. of Lou.); B.S. cum laude (W.C.) Phi Kappa Phi

Professional Societies

American Chemical Society
American Association for Advancement of Science

Publications

1. Ashworth, M. J. and Abeles, T. P., Neutron Activation Analysis and Archaeology, Nature, 210, 9-11, (1966).
2. Abeles, T. P. and Bos, W. G., A Dimensional Analysis of Magnetic Susceptibility Calculations, J. Chem. Educ., 44, 438-441, (1967).
3. Abeles, T. P., A Mössbauer Effect Study of Compounds of Dysprosium (Thesis).
4. Abeles, T. P. and Bos, W. G., A Mössbauer Study of Compounds of Dysprosium (in preparation) accepted J. Phys. Chem. Solids)
5. Dessy, R. E., Abeles, T. P., Charkoudian, J. C., Organometallic Electrochemistry-
Languages The Bonding Picture of Iron Olefin Tetracarbyls(in prep)

Reading knowledge of French and German

Employment

Fall 1968 - Present

Research Associate
Department of Chemistry
Virginia Polytechnic Institute
Blacksburg, Virginia 24061

Fall 1967

Instructor
Department of Chemistry
Kentucky Southern College
9001 Shelbyville Road
Louisville, Kentucky 40222

Spring 1966

Teaching Assistantship
Department of Chemistry
University of Louisville
Louisville, Kentucky 40208

Fall 1963 - Fall 1965

Teaching Assistant and Research Associate
Department of Chemistry
University of Michigan
Ann Arbor, Michigan

Summer 1963

Student Aid (Activation Analysis)
Chemistry Division
Argonne National Laboratory
Argonne, Illinois

Fall 1962 - Spring 1963

Laboratory Assistant
Department of Chemistry
Wilmington College
Wilmington, Ohio

Fall 1959 - Fall 1962

Production Worker (School Work-
Study Program)
Randall Division of Textron
Wilmington, Ohio

References Upon Request

Date Available: August, 1969

c/o Bodrum Muzesi
Bodrum
TURKEY
July 31, 1969

Mr. Tom P. Abeles
Department of Chemistry
Virginia Polytechnic Institute
College of Arts and Sciences
Blacksburg, Virginia 24061

Dear Mr. Abeles:

Thank you very much for your letter of July 3, which was just forwarded to me here in Turkey. Unfortunately, there is no full-time employment in the field of underwater archaeology at our Museum. The work is done only during the three summer months and our staff consists chiefly of students and volunteers.

I will forward your letter and resume to the University Museum's Applied Science Center for Archaeology. They have a number of chemists on their staff, though I do not know if they need additional help at this time.

Sincerely,

George F. Bass

10-20 hrs per wk,
both news, \$ 3.00 =

Student
Princeton

APPLICATION

SOCIAL SECURITY NO. 049-40-2088

NAME ABERCROMBIE JOHN DATE July 19 1974

ADDRESS School address unknown. Contact De Pritchard BIRTH PLACE Worcester Ma DATE 11-22-48

MAIDEN NAME (if married woman) Home address: 51 Ardmore Rd Milford, CT TEL. NO. (203) 8788407

SPECIAL SKILLS (machines, etc.) Administration

PREVIOUS EMPLOYMENT RECORD

EMPLOYED BY	ADDRESS	POSITION	DATES FROM-TO	REASON LEFT
Interfaith Young Adult Ministries	Boston Ma. 490 Beacon St	State liason for Youth Services Program Acting Summer Director	1973-74	moved
Boston University	Boston Ma. 16 Beal St	Pool Attendant	1971-74	moved
Milford Public School	Milford, CT. Eel's Hill	summer job. Groundsman	1970	moved

EDUCATION

DEGREES AND DATES

Gettysburg College	BA	June 1971
Boston University	ThM	May 1974

REFERENCES (Give name, address and phone number (if known) of three personal refs.)

Dr H. Neil Richardson	Boston, Ma. 745 Commonwealth Ave (B.U. School of Theology)
Dr H. Beck	Boston, Ma. 745 Commonwealth Ave (B.U. School of Theology)
Rev. George Whitehouse	Boston, Ma. 490 Beacon St. (617) 2618280

local phone: 3498735

Interviewed 9/27/74

RESUME

John Rogers Abercrombie

Education:

1974 The University of Pennsylvania Graduate School
to Candidate for Doctor of Philosophy degree. Concentrating
present in Palestinian Archaeology and Classical Hebrew.
Minor is Egyptology.

1971 Boston University School of Theology
to Received Master of Theology degree, May, 1974. Majored
1974 in Biblical Studies and concentrated in Old Testament
History.

1967 Gettysburg College History Department
to Received Bachelor of Arts degree, June, 1971. Majored
1971 in European History and minored in Religion. Junior
Year Abroad Program, Wagner College Extension in
Bregenz, Austria. Summer Study Program at Tell Gezer,
Hebrew Union College in Jerusalem, Israel.

Record:

1967 Magna cum Laude, Boston University.
to Reverend Edmund M. Beebe Fellowship.
present Jeffery Petterson History Award, Gettysburg College.
Academic Honors, Gettysburg College.
Academic Honors, Wagner College.
National Honor Society.
Phi Alpha Theta Society.

Employment:

1967 Assistant Director of Shelter Care Program for the
to Department of Youth Services, State of Massachusetts.
present Pool Attendant, Boston University.
Counsellor, Washingtonian Hospital for Addiction.
Chairman of Save the Children Fund Drive, Gettysburg College.
Committeeman for Save Biafra, Gettysburg College.
Teacher, Upward Bound Tutorial Program, Gettysburg College.

summer Summer Director of Shelter Care Program for the
work Department of Youth Services, State of Massachusetts.
Pool Attendant, Boston University.
Groundsman, Milford Public Schools.
Stock Boy, Joe Day Inc.
Camp Counsellor, City of Orange.
Lifeguard, City of Milford.

2-

Personal data:

Born: November 22, 1948, Worcester, Massachusetts;
Height 5'8", Weight 140lbs.

Address: John R. Abercrombie
51 Ardmore Rd.
Milford, Connecticut
Telephone: Area Code 203-8788407

ADVANCED SYSTEMS LABORATORIES, INC.
9 FAYETTE STREET
ROCKVILLE, MARYLAND 20850

January 12, 1964

Dear Miss Ralph:

Enclosed please find our Seismiktron model B, Serial No. 544. This unit has been used as a demonstrator for a period of about one month, and if you desired to keep it you can have it at a discounted price of only 1400.00 dollars, which is the lowest we could offer it. I would appreciate that this price be kept confidential, since is considerably less than we ask profit-making organizations.

I hope that the instrument arrived in ample time to make the trip, and I wish you a successful expedition.

*Sincerely yours,
Manuel Chislow*

23 marzo 1967

Caro Dott. Adamasteanu,

Mi dispiace ma non ci sono lastre 9 x 12 cm per la Linhof negli Stati Uniti. Si dovranno comperare in Europa.

Fro Rainey porterà 7 rulli da 430 foto l'uno di tipo 5424 agli infrarossi e 2 filtri Wratten No. 25 per l'obbiettivo. Fro arriverà a Roma verso il 9 aprile e consegnerà il materiale al Direttore dell Archaeological Aero Service a Roma, Via Lincoln 1, EUR.

Fro dovrà partire il 10 aprile per andare in Grecia e in Turchia. Sarà di ritorno a Roma per la fine del mese.

Molti cari saluti,

Betta e Franca Callori

Beth Ralph



MINISTERIO DE EDUCACION
ADMINISTRACION DEL PATRIMONIO CULTURAL
DIRECCION DE INVESTIGACION

5 September 1977

Drs. Elizabeth K. Ralph
Darrel Butterbaugh

MASCA
University Museum
Philadelphia PA
EE. UU. de A.

Dear Drs. Ralph and Butterbaugh:

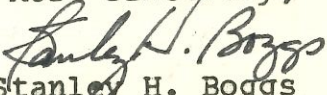
We are extremely grateful to you both for the many kindnesses and instruction given generously to my assistant, Manuel R. López, during the week he spent with you recently. I am sure he learned a great deal from the experience and look forward to his putting the skills in practice as soon as the dry season begins.

While I don't expect to reach Philadelphia in the immediate future, a date with an optometrist in Miami on 28 November might put me in range of Dr. Butterbaugh at about the right time, if he will have reached Pompano Beach by then. I should like to see how his experiment with the facing material has withstood the weather of Florida -- as well, naturally, to meet the kind advisor who may have solved our archaeological restoration problem. And certainly I'd like to query how a decent Silver Lake fellow manages to join a Warsaw character in such exotic problems as Salvadoran archaeology generates!

We hope our C14 lab will begin work again shortly. As Manuel probably informed you, it has been closed since last November due to the University's closure. We are very much interested in the processing of small samples, as I suppose are all diggers, and the notice in TIME some weeks ago to the effect that the U. of Rochester has tried a different technique with good results leads me to hope that our people can learn the process. I don't know what this would involve, but would greatly appreciate learning of it.

Lic. Roberto Huezo, Director of Patrimonio Cultural, joins me in thanking you both for your favors to Manuel, and hopes that both of you may find time in the future to inspect the application of the knowledge gained.

Most sincerely,


Stanley H. Boggs
Dpto. de Arqueología ✓

EL SALVADOR

September 20th, 1977

Dr. Stanley H. Boggs
Dpto. de Arqueologia
Ministerio de Educacion
Administracion del Patrimonio Cultural
Avv La Revolucion,
Col. San Benito,
San Salvador
El Salvador, C.A.

Dear Dr. Boggs,

It was a pleasure to have Manuel Lopez visit us, and I hope that we were of some help.

Darrel Butterbaugh will be happy to see you in Florida and to show you the test specimens at Florida Atlantic University. He plans to arrive in Florida on November 29th or 30th, and he hopes that you can extend your stay to match the latter date. His phone in Florida is (305) 942-2616 and the address is: 2726 N.E. 31st Court, Pompano Beach, Fla. 33064. In Pennsylvania his phone number is (215) 646-0973; address, 150 Macklenburg Drive, Penllyn, Pa. 19422 (until Nov. 27th).

In regard to ^{14}C dating, the Rochester process is in the first stages of experiments, and I do not anticipate that it could be used on a routine basis for 5 to 10 years. It requires a tandem particle accelerator (or equivalent), two specialized mass spectrographs, etc. Also, so far no one has figured out how to calibrate the enrichment of ^{14}C quantitatively,

When the details are published, I shall try to remember to send you a copy. In the meantime it is best to continue with your regular method of dating.

Sincerely yours,

Elizabeth K. Ralph

AERO SERVICE
CORPORATION
A DIVISION OF LITTON INDUSTRIES

RESOURCES DEVELOPMENT ENGINEERING • 210 EAST COURTLAND STREET • PHILADELPHIA 20, PENNSYLVANIA

TELEPHONE: GLADSTONE 7-3000 • CABLE: AERCORP

August 12, 1964

Dr. F. Rainey
Univ. of Pennsylvania Museum
33rd & Spruce Streets
Philadelphia 4, Pa.

Dear Dr. Rainey:

At the close of your TV show on Sunday, August 1,
you commented on the desirability of covering much
more area rapidly with geophysical measurements.

The airborne geophysical systems that we have used
in surveying gross areas for mineral and petroleum
companies may solve your problem. If you would like
to investigate this possibility, we would be happy
to have one of our geophysicists visit you at your
convenience.

Enclosed are some of our recent publications which
will give you an idea of the scope of services we
can provide.

Sincerely yours,

AERO SERVICE CORPORATION

Thomas O'Malley

Thomas O'Malley
President

TOM/lv
att.

COPY

AERO SERVICE CORPORATION • A DIVISION OF LITTON INDUSTRIES

ASCA

October 8, 1964

Dr. Froelich Rainey
c/o Enrico Mueller
Cassano Ionio
Cosenza, Italy

Dear Dr. Rainey:

We are very sorry here, also, about the necessity to cancel the photographic phase of your explorations at Sibaris. The subject had become a matter of very great interest to many of us.

I feel that I made a serious error in cabling you the possible maximum cost if we were to do everything which might seem logical, and I share your hope that in the future we can have a little more time so we can agree on the important details.

Here is the evolution of our plans: We started by planning to send two rolls of each of four types of film to Italy so that any errors could be covered and so that some variety of environment might be employed. We were going to use an aerial photographer of long experience with the company who was at that time on a job in Kuwait.

As the project developed it engrossed the attention of Dr. Meijer and we decided to train him for the routine of camera operation with the thought that he could sit with you on the interpretation in addition to supplying his judgment at the taking of the photographs. We envisioned his taking the photographs and then staying in Europe on a vacation while they were being processed, after which

10/8/64

he would return to the examination and field correlation of the evidence. We feared that there might be some delay in installing the camera and thus we had to allow for a fair number of his days at the site and then a reasonable allowance of time for the correlation.

We agreed to do our work on a non-profit, or virtually non-profit, basis but we cannot escape relatively high overhead for a professional group, so that when we added the cost of film and development, almost \$1,000, to airfare and a possibly extended stay, I thought it best to fatten the figure for estimating purposes and I see now that I rather grossly overdid it.

I look forward to seeing you after you return and I believe that we can work more fruitfully in the future, for the matter is of great interest to us.

You will remember that I discussed the Symposium on Remote Sensing of Environment at the University of Michigan. I am enclosing the agenda with the hope that you or one of your staff may attend. We will be set up at the Student Union Building -- telephone number 313-662-4431 -- and will be glad to cooperate in getting last minute accommodations. For the sake of simplicity, I am enclosing a copy of a letter to one of the oil companies who will be attending.

Yours very truly,

EXPLORATION SYSTEMS DIVISION

Homer Jensen
Director

HJ:dr
Encls.

THE UNIVERSITY OF MICHIGAN
BOX 618
ANN ARBOR, MICHIGAN 48107
AREA CODE 313 483-0500
Extension 284

THIRD SYMPOSIUM ON REMOTE SENSING OF ENVIRONMENT

October 14, 15, 16, 1964
The University of Michigan
Ann Arbor, Michigan

The Third Symposium on Remote Sensing of Environment will be held on Wednesday, Thursday and Friday, October 14 through 16, 1964, on the Campus of The University of Michigan. The symposium is being conducted as part of a continuing program investigating the field of remote sensing of environment, its potential in scientific research and engineering practices, and some of the factors that are important to growth of the field. This work is being conducted by the Infrared Laboratory of the Institute of Science and Technology at The University of Michigan and is sponsored by the Office of Naval Research with funds made available by the ONR Geography Branch and the Air Force Cambridge Research Laboratory.

The purpose of the symposium is to stimulate information exchange on all aspects of the subject of remote sensing from airborne and satellite platforms. General topical matter will include applications for remote sensing, design considerations for sensors and carrying vehicles, and data analysis programs and techniques.

Attendance at the symposium is open to all interested scientists and engineers.

Further information may be obtained by contacting Mr. Dana C. Parker at the above address.

The University of Michigan
Institute of Science and Technology

THIRD SYMPOSIUM

on

REMOTE SENSING OF ENVIRONMENT

October 14, 15, 16, 1964
The Rackham Lecture Hall

TENTATIVE AGENDA

Wednesday Morning, October 14, 1964

- 8:00 - 9:00 Registration - Rackham Lecture Hall
- 9:00 - 9:20 Introduction and Welcome
- 9:20 - 9:30 Announcement: The National Academy of Sciences
National Research Council Committee on Remote
Sensing of the Environment

SESSION I

- Chairman: George J. Zissis, Institute of Science and Technology,
The University of Michigan, Ann Arbor, Michigan
- 9:30 Planetary Exploration from Orbital Altitudes (Invited Paper)
Peter C. Badgley, National Aeronautics and Space Admin-
istration Headquarters, Washington, D. C.
- 10:10 National Aeronautics and Space Administration Mars
Program (Invited Paper)
Rollin W. Gillespie, National Aeronautics and Space Admin-
istration Headquarters, Washington, D. C.
- 10:40 ✓ Application of a Photometric Technique for Mapping the
Lunar Surface
M. E. Amdursky, Bendix Systems Division, Ann Arbor,
Michigan
- 11:00 ✓ Radar Mapping of Venus From an Orbiting Spacecraft
R. F. Schmidt, Avco Corporation, Cincinnati, Ohio

(Tentative Agenda Con't)

- 11:20 ✓ Variables Influencing Image Interpretation Performance
in Manned Space Surveillance Systems
P. E. Resta, Goodyear Aerospace Corporation, Litch-
field Park, Arizona
- 11:30 ✓ Motivation for Simultaneous Multispectral Reconnaissance
R. R. Legault and M. R. Holter, Institute of Science
and Technology, The University of Michigan, Ann Arbor,
Michigan

12:00 LUNCH

SESSION II

Wednesday Afternoon, October 14, 1964

Chairman: Anthony R. Barringer, Barringer Research, Limited,
Rexdale, Toronto, Canada

- 1:30 The National Center for Atmospheric Research Aviation
Facility (Invited Paper)
Robert A. Ragotzkie, The University of Wisconsin, Madison,
Wisconsin
- 2:00 The Detection of Generating Eddies in Clear-Air Turbulence
Aloft by Acoustical Sensing
F. C. Bates, Institute of Technology, Saint Louis University,
St. Louis, Missouri
- 2:15 An Infrared Technique for the Remote Detection of Clear-
Air Turbulence
R. W. Astheimer, Barnes Engineering Company, Stamford,
Connecticut
- 2:35 High Resolution Infrared Radiation Measurements with the
NIMBUS Meteorological Satellite
I. L. Goldberg, L. Foshee, W. Nordberg, and C. Catoe,
National Aeronautics and Space Administration, Greenbelt,
Maryland
- 2:55 Infrared Measurements of Clouds from a U-2 Platform
Francis R. Valovcin, Air Force Cambridge Research
Laboratories, Bedford, Massachusetts

(Tentative Agenda Con't)

- 3:15 Pattern Recognition of Meteorological Satellite Cloud
 Photography
 Yale H. Katz, The RAND Corporation, Santa Monica,
 California
- 3:35 The Determination of the Vertical Profile of Atmospheric
 Gases by Means of a Ground Based Optical Radar
 Richard M. Schotland, New York University, Bronx;
 New York
- 3:45 Earth Radiation Measurements by Interferometer From
 a High Altitude Balloon
 Lucian W. Chaney, The University of Michigan, Ann Arbor,
 Michigan
- 4:00 A Method for Determination of the Tropospheric Temp-
 erature Structure from Ground-Based Measurements of
 Oxygen Emission
 E. R. Westwater, National Bureau of Standards, Boulder,
 Colorado
- 4:20 Width of the Microwave Lines of Oxygen and Their Relation-
 ship to the Thermal Noise Emission Spectrum of the Atmos-
 phere
 Richard L. Abbott, National Bureau of Standards, Boulder,
 Colorado

SESSION III

Thursday Morning, October 15, 1964

Chairman: William Fischer, U. S. Geological Survey, Washington, D. C.

- 9:00 ✓ Remote Sensing of Vapors as an Airborne Exploration Tool
 (Invited Paper)
 Anthony R. Barringer, Barringer Research, Limited, Rex-
 dale, Toronto, Canada
- 9:30 ✓ Infrared Geology
 R. C. Holmer, and D. W. Strangway, Bear Creek Mining
 Company, Denver, Colorado

(Tentative Agenda Con't)

- 10:00 ✓ An Information Note on an Airborne Laser Terrain Profiler for Micro-Relief Studies
R. Remple, Spectra Physics, Incorporated, Mountainview, California, and A. K. Parker, Aero Service Corporation, Philadelphia, Pennsylvania
- 10:20 ✓ Microwave Radiometer Measurements Program
W. H. Conway and R. T. Sakamoto, Space-General Corporation, El Monte, California
- 10:40 ✓ Photography of the Earth from Space and Its Non-Meteorological Applications
J. B. Bird and A. Morrison, McGill University, Montreal, P. Q., Canada
- 10:55 Infrared and Visible Radiation Measurements by Radiometer on High Altitude Balloon Flights at 34-km Altitude
F. L. Bartman, The University of Michigan, Ann Arbor, Michigan
- 11:10 ✓ Line-Scanning Reconnaissance Systems in Land Utilization and Terrain Studies
Thomas R. Ory, HRB-Singer, Incorporated, State College, Pennsylvania
- 11:25 ✓ Aerial Reconnaissance of Surface Features with the Multiband Spectral System
Carlton E. Molineux, Air Force Cambridge Research Laboratories, Bedford, Massachusetts
- 11:45 Target and Background Signatures
T. Limperis, Institute of Science and Technology, The University of Michigan, Ann Arbor, Michigan
- 12:00 LUNCH

SESSION IV

Thursday Afternoon, October 15, 1964

Chairman: Laurence H. Lattman, Pennsylvania State University, University Park, Pennsylvania

(Tentative Agenda Con't)

- 1:30 ✓ Radar Geology (Invited Paper)
H. L. Cameron, Acadia University, Wolfville, Nova Scotia,
Canada
- 2:00 ✓ Geographic Research Potential of Earth-Satellites
Robert H. Alexander, Office of Naval Research, Washington,
D. C.
- 2:20 ✓ Recent Progress in Remote Sensing with Audio and
Radio Frequency Pulses
Marten Geleynse and Anthony R. Barringer, Barringer
Research, Limited, Rexdale, Toronto, Canada
- 2:50 ✓ Review of Some Fundamentals in Non-Contact Electromagnetic
Sensing for Geoscience Purposes
Frank E. Kinsman, Texas Instruments Incorporated, Dallas,
Texas
- 3:10 ✓ Infrared Imagery of Yellowstone Park
J. H. McLerran, U. S. A. CRREL, Hanover, New Hampshire
- 3:30 ✓ Airphoto Interpretation of Engineering Soil in a Tropical
Environment
Ta Liang, Cornell University, Ithaca, New York
- 3:50 ✓ Detection and Location of Subsurface Coal Fires
Ronald J. Slavecki, HRB-Singer, Incorporated, State College,
Pennsylvania
- 4:05 The Consequences of Terrestrial Surface Infrared Emissivity
K. J. K. Buettner, The University of Washington, Seattle,
Washington, and Capt. C. D. Kern, and J. F. Cronin, Air
Force Cambridge Research Laboratories, Hanscom Field,
Massachusetts
- 4:25 ✓ Hawaii Infrared Volcano Survey
William Fischer, U. S. Geological Survey, Washington, D. C.

SESSION V

Friday Morning, October 16, 1964

Chairman: Lucien Biberman, Institute for Defense Analysis, Washington,
D. C.

(Tentative Agenda Con't)

- 9:00 ✓ Remote Sensing of Vegetation (Invited Paper)
 David M. Gates, National Bureau of Standards, Boulder,
 Colorado
- 9:45 ✓ Potential Applications of Remote Sensing to Ecological
 Research
 Charles F. Cooper, The University of Michigan, Ann Arbor,
 Michigan
- 10:00 Thermal Infrared Imagery and Its Use in Vegetation
 Analysis by Remote Reconnaissance
 Robert N. Colwell, The University of California, Berkeley,
 California, and Don L. Olson, Texas Instruments, Incor-
 porated, Dallas, Texas
- 10:20 Preliminary Experimental Results With Infrared Line
 Scanners for Forest Fire Surveillance
 Stanley N. Hirsch, Northern Forest Fire Laboratory,
 Missoula, Montana
- 10:50 Portable Low Cost Detector for Latent Forest Fires
 Everett M. Baily and W. R. Parish, The University of Idaho,
 Moscow, Idaho
- 11:10 ✓ Multispectral Data Collection and Analysis
 D. S. Lowe, F. C. Polcyn, Institute of Science and Tech-
 nology, The University of Michigan, Ann Arbor, Michigan,
 and R. Shay, Purdue University, Lafayette, Indiana
- 11:25 ✓ Quantitative Airborne Infrared Mapping
 J. O. Morgan and G. England, Institute of Science and
 Technology, The University of Michigan, Ann Arbor,
 Michigan
- 11:45 LUNCH

SESSION VI

Friday Afternoon, October 16, 1964

Chairman: Trevor Harwood, Defence Research Board, Ottawa, Ontario,
Canada

(Tentative Agenda Con't)

- 1:00 A Resumé of the Woods Hole Oceanographic Institution Conference on Oceanographic Observations from Manned Satellites (Invited Paper)
Gifford C. Ewing, Woods Hole Oceanographic Institution, Woods Hole, Massachusetts
- 1:30 The Use of an Infrared Mapper in the Study of Small-Scale Ocean Circulations (Invited Paper)
William McLeish, Scripps Institution of Oceanography, San Diego, California
- 2:00 Remote Measurement of Absolute Sea Surface Temperature by Infrared Radiometry
Albert H. Oshiver, U. S. Coast and Geodetic Survey, Washington, D. C.
- 2:20 Application of Microwave Radiometers to Oceanography
Austin Mardon, Space-General Corporation, El Monte, California
- 2:50 ✓ Infrared Image Applications in Studies of the Marine Environment
Gustavo A. Antonini, HRB-Singer, Incorporated, State College, Pennsylvania
- 3:05 ✓ A Preliminary Airborne Infrared Survey of Lake Erie
A. Beeton, J. Moffet, U. S. Bureau of Commercial Fisheries, Ann Arbor, Michigan and Dana C. Parker, Institute of Science and Technology, The University of Michigan, Ann Arbor, Michigan
- 3:20 Infrared Sea Ice Reconnaissance
James H. McLerran, U. S. Army Cold Regions Research and Engineering Laboratory, Hanover, New Hampshire
- 3:40 Ice Measurements with a Microwave Radiometer
H. G. Pascalar and R. T. Sakamoto, Space-General Corporation, El Monte, California
- 3:55 ✓ Investigations of Multispectral Image Interpretation
R. R. Legault and F. C. Polcyn, Institute of Science and Technology, The University of Michigan, Ann Arbor, Michigan
- 4:10 Closing

Techniques

Mal

September 2, 1964

Dear Mr. O'Malley:

I just have your letter of August 12th, regarding aerial survey and archaeology, upon my return from vacation, and I would be very glad to talk to you about this possibility.

I am just now planning an aerial survey of our big site at Sybaris in South Italy, with the ITEK Corporation of Concord, Massachusetts, but I see no reason why we should not hit closer to home.

Would you care to have lunch with me one day, here at the Museum, before I get off, or would you let me know when we could look into this matter. Unfortunately, I leave again for Italy about September 16, and will be back around the middle of October.

Very best wishes,

Froelich Rainey
Director

Mr. Thomas O'Malley
President
Aero Service Corporation
210 Courtland Street
Philadelphia 20, Pennsylvania

April 27, 1967

Mr. Homer Jensen, Director
Systems Engineering
Aero Service Corporation
4219 Van Kirk Street
Philadelphia, Pa. 19135

Dear Mr. Jensen:

Thank you for visiting our laboratories yesterday.

A preprint of our most recent article on the use of our cesium magnetometer was just typed, and I am sending it along in case you would like to have it.

I hope that your project in Sicily will materialize and that it will be possible to do some aerial magnetometer surveys over the plain of Sybaris.

Sincerely yours,

Elizabeth K. Ralph

EKR/adw

UNIVERSITY of PENNSYLVANIA

PHILADELPHIA 4

The College

DEPARTMENT OF PHYSICS
Radiocarbon Laboratory

August 22, 1972

Dr. Jean S. Aigner
The University of Connecticut
Department of Anthropology
Storr's Connecticut 06268

Dear Dr. Aigner:

Enclosed please find the dates for your three samples from Anangula summarized as they will appear in Radiocarbon. You will notice two columns of dates, the left has been calculated with the 5568 half-life while the right has been calculated with the 5730 half-life. As you know, the 5730 half-life dates are the more accurate ones, but do not get published in Radiocarbon.

The site description is essentially the same as for the previous series from Anangula (see date list enclosed), while the sample descriptions were compiled from the information sheets. If you have additions, corrections or comments to add, please let me know promptly.

Sincerely yours,

Barbara Lawn
Barbara Lawn

cc: Dr. Rainey
University Museum

Anangula series

Anangula site (53° 00' N Lat, 168° 51' W Long), is on Anangula (Ananiulak) Island, 1.6 mi long, 0.5 mi wide, ca. 4.5 mi NW of Nikolski village on Umnak Island in eastern Aleutians. This is a single component site, 17 to 20 m above present sea level, characterized by unifacial tools, including many Lamellar-flake tools. Samples coll. June and July 1970 and subm. by J. S. Aigner, The Univ. of Connecticut, Storrs, Connecticut. For additional dates from this site see P-1102, P-1103, P-1104, P-1105, P-1107 and P-1108 (R., 1967, v.9, p. 356-357)(Black and Laughlin, 1964; Laughlin, 1963; Laughlin and Marsh, 1954).

	5568 <u>half-life</u>	5730 <u>half-life</u>
	6991 ± 90	7202 ± 93
P-1836. F-12-s, w-II	5041 B.C.	5252 B.C.

Charcoal, sample code F-12-s, W-II, from living zone outside house, on soil formed on volcanic ash, at depth of 5' from modern surface. Age estimated at 8000 B.P., with possible limits of 7800-8500 B.P. Comment: NaOH pretreatment.

	7793 ± 113	8027 ± 116
P-1837. F-24-Vd, F-25-Vd, F-24-III & Vd and F-25-III & Vd	5483 B.C.	6077 B.C.

Charcoal, sample codes F-24-Vd, F-25-Vd, F-24-III & Vd, and F-25-II & Vd, from continuous carbonaceous zone, 5 to 5 1/2' from modern surface; probably temporally equivalent remains from zone clearly within a small hearth area. Hearth and house floor are resting on volcanic ash. Age estimated at 8000-8400 B.P., with range as much as 7800-9000 B.P. Comment: NaOH pretreatment.

	7000 ± 91	7210 ± 94
P-1835. F-6-e-V, F-11-w-V	5050 B.C.	5260 B.C.

Charcoal, sample codes F-6-e-V and F-6-w-V from zone believed to relate to initial occupation, at depth of 5 1/2' from modern surface, probably outside major house in E and beneath fill from latter. Occupation rests on volcanic ash layer. Comment: NaOH pretreatment.

COPY

AERO SERVICE CORPORATION • A DIVISION OF LITTON INDUSTRIES

ASCA
October 8, 1964

Mr. F. M. Ayers
American Overseas Petroleum Ltd.
485 Lexington Ave., 7th Floor
New York, N. Y. 10017

Dear Mr. Ayers:

We are pleased that you will be attending the Third Symposium on Remote Sensing of Environment at the University of Michigan on October 14, 15 and 16. Sessions will be held at the Rackham Lecture Hall. Aero Service personnel attending the Symposium -- Homer Jensen, Alan Parker, Glenn Landis and I -- will be staying on the University campus at the University of Michigan Union in Ann Arbor and we would like to have you contact us there on your arrival if you should need assistance of any kind. The phone number is 313-662-4431.

Accommodations have been made in your name for the nights of the 13th, 14th and 15th at the Howard Johnson Motor Lodge, 45945 Detroit Industrial Expressway, Belleville, Michigan. The telephone number there is 313-0X9-2041.

The Howard Johnson Motor Lodge is located between the Willow Run and the Detroit Metropolitan Airports, about four miles east of Willow Run Airport. Bus service will be provided from the motor lodge to the symposium meetings.

Mr. F. M. Ayers
Page Two

10/8/64

We have enclosed a copy of the announcement and the tentative agenda. We look forward to seeing you.

Yours very truly,

EXPLORATION SYSTEMS DIVISION

Alfred J. Navazio
Manager, Petroleum Exploration

AJN:dr
Encls.

January 16, 1967

Mrs. James Akerman
R. D. #1
Landenberg, Penna. 19350

Dear Mrs. Akerman:

In connection with "The Search for Buried Cities" on February 18th, I have included some photographs and bibliographical material. On page 4 in Expedition, there is a short bibliographical summary.

I'm looking forward to seeing you.

Sincerely yours,

Elizabeth K. Ralph

EKR/deh

30 March 1967.

Dear Bernard,

Your letter about geophysical surveys at Cadbury arrived just as I was going to Cadbury for just that.

So I'm writing this after a day running around with Fitzer and the Oxford magnetometer, plus Deeco, plus a Soil Conductivity Gradient Detector which our own department is developing.

Needless to say I found your letter very interesting. I'm afraid that we don't get the MASCA Newsletter - unless it is something that goes to Richard and disappears into a file. As I understand it, the caesium magnetometer is

extremely sensitive, whereas the soil at Cadbury is very strongly conductive; so I wonder whether the caesium magnetometer is appropriate for the site.

The other problems would be one of timing. If you would need assistance, even unskilled, presumably the survey would have to be done during the excavation period. But as you will recall, the site will then be swarming with visitors, which is not very helpful for a geophysical survey - we are funding even the very few visitors we have at the moment are a great nuisance.

L. Alcock
Univ. Coll.
Cardiff, Wales

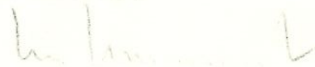
January 6, 1973

Mr. Christopher G. Allen
1204 Hanser Lane
Godfrey, Ill. 62035

Dear Mr. Allen,

Thank you for your letter of December 26. Dr. Rainey is out of the country and will return the last week in January. You should be hearing from him at that time.

Sincerely,



David Crownover

DC/sa

Dr. Froelich Rainey
Director, University Museum
33 rd & Spruce sts.
Philadelphia, PA 19104

Dec. 18, 1972

Dear Dr. Rainey,

I am writing you on the recommendation of Mr. Julian Whittlesey, who urges me to investigate the approach the Museum Applied Science Center for Archaeology is using in the field. I first came in contact with Mr. Whittlesey as I was doing some research into the bipod for possible use at Morgantina, a site in central Sicily under excavation by the University of Illinois and Princeton. I am working as that site's photographer and in the autumn of 1970 I was determined to improve upon our method for taking obliques.

Correspondence on that and other matters of mutual interest preceeded my actual meeting of Mr. Whittlesey at Cincinnati last December. We had the chance to discuss possible modifications of the bipod as well as some of the problems surrounding reading infrared information. As a result of the exchange of several ideas since that time we are planning to fly our cameras (via balloon) and shoot the bipod as well at Morgantina this coming season.

Having committed myself fairly heavily to archaeometric survey Mr. Whittlesey suggested strongly that I get in touch with you before the meetings in Philadelphia to see if I might have a chance to meet you and discuss MASCA. I am sure that, with the AIA-APA convention in Philadelphia this year your time is filled with commitments already. I would not like to inconvenience you in anyway, but if you anticipate a free moment in your schedule I would be most grateful for the opportunity of meeting you.

Thank you very much,


Christopher C. Allen
1204 Hanser La.
Godfrey, IL 62035

August 13, 1965

Miss Louise A. Alpers
c/o Bryn Mawr College Excavations
Elmalı (Antalya)
Turkey

Dear Miss Alpers:

We had a meeting this morning in regard to the metallurgical-archaeological project. Dr. Maddin (Chairman of Metallurgy) thinks that your proposed study of glazes is very worthwhile, but, unfortunately, it is not appropriate for this particular grant. Since this is a government grant and a research project with metals in specified, we hesitate to diverge into glazes.

Both Dr. Maddin and I suggest that you write a separate grant proposal for your project. It is quite likely that it would be supported by Corning-Owens or if not, by the National Science Foundation. I'll be glad to help you write it in November and Dr. Maddin has offered his advice and metallurgical facilities to carry it out.

Sincerely yours,

Elizabeth K. Ralph
Associate Director

EKR:ewj

A STUDY OF THE GLAZE INDUSTRY
IN THE ANCIENT NEAR EAST

ASCA
Metallurgical
Project

The technique of glazing, which apparently originated somewhere in the Near East during the fifth millennium B.C., has yet to be systematically or thoroughly examined in its early phases. These incipient achievements clearly merit serious investigation. Not only would the data contribute vitally to the comprehensive history of glaze and glass development, but the industry with its relatively indestructible and often portable products would also seem especially promising as a potential tool in the archaeologically task of culture reconstruction.

Such a study must be viewed as a long range scheme with infinite possible ramifications and thus can be practically conceived of solely in terms of numerous discrete and valid individual projects. The geographical and chronological context of immediate interest - i.e. the Near East and Eastern Mediterranean from the fifth to the second millennium B.C. - has been previously surveyed (cf. L. Alpers, "A Study of the Glaze Industry in the Ancient Near East from the Fifth Millennium B.C. through the Late Bronze Age", Bryn Mawr College, 1963.). In the course of this study, the cultural and to some extent technical questions have been at least partially defined. As proposed, further research will now proceed with intentions of investigating in depth one facet of the problem, the results to be submitted as a Phd. dissertation. The specific archaeological topic has not yet been determined, since the choice must inevitably be regulated by the availability and nature of a laboratory program which must be considered an integral part of the inquiry.

Not appropriate for this grant
Coming - Owens - People

Numerous samples of pertinent glazed objects are present within the Egyptian and Mesopotamian collections of the University Museum.* Undoubtedly, supplementary material would be forthcoming from additional sources, especially if the analytical procedures were of a non-destructive nature. From a carefully selected body of archaeological evidence, one would wish in general to investigate all or some of the following factors - the raw materials employed in the production, the methods of application and manipulation, firing requirements and procedures etc. This data, if accumulated in adequate quantities and considered in conjunction with associated morphological and stratigraphic observations, would help to define local industries and perhaps ultimately resolve some basic problems of area interaction and relative chronology.

More specifically, one could orient such research in an effort to elucidate the explicit question of various glaze-base combinations with its cultural and technical implications. Or, similarly, a controlled project could be most profitably designed to determine the earliest appearances and geographic range of the significant lead-glazing procedure.

A program involving object analyses might, in addition, also require attempts to duplicate the procedures in question - the reconstruction, ^{being} guided either by contemporary observations or, more preferably, by instructions preserved in ancient texts. Furthermore, perhaps the most central and fundamental issue in the entire theme - the conditions of discovery - must also be objectively and thoroughly examined in the laboratory; this

* Possible candidates for the project at the University Museum include a variety of Egyptian sites as well as Ur, Nippur, and Tell Rimah, etc.

would incorporate a re-evaluation of the often suggested explanation of glazing as an accidental by-product of metallurgical practices.

Thus, the immediate possibilities offered for further glaze research are diverse and flexible in design. One need only reiterate that any investigation must be pursued with foresight in an effort to ultimately coordinate a fund of archaeological, scientific, and textual information concerning the most ancient phases of the glaze industry.

Louise A. Alpers
July, 1965

*American Association
for the Advancement of Science*

1515 MASSACHUSETTS AVENUE, NW, WASHINGTON, D. C., 20005

Phone: 387-7171 (Area Code 202)

Cable Address: Advancesci, Washington, D. C.

August 9, 1967

*File
Arch. Pack 79*

Dr. F. Rainey
The University Museum
University of Pennsylvania
Philadelphia, Pa.

Dear Dr. Rainey:

Dr. Frank Whitmore and I, after carefully considering all the pros and cons, have come to the conclusion that it would be better to postpone the AAAS Symposium on "Remote Sensing of the Environment". We were guided in this judgment by several thoughts, the most persuasive of which was that a very detailed summer study is in progress on this subject at Woods Hole this year and again in 1968 for NASA, under the direction of the National Academy of Sciences. There is a reasonable chance that a AAAS discussion next year on this subject (in Dallas, Texas) would give a much clearer and more useful picture of the state-of-the-art, than is possible this year. We hope, as the plans unfold, that we may be in touch with you again.

With sincerest regards,



Walter G. Berl
AAAS Meeting Editor

WGB:eds

April 28, 1964

Dr. T. N. Campbell, Editor
American Antiquity
Box 8179, University Sta.
Austin, Texas 78712

Dear Dr. Campbell:

Thank you for your letter of April 24th in regard to the manuscript on radiocarbon dates from Tikal.

A publication date of April 1965 is perfectly acceptable.

As for the title, Dr. Satterthwaite prefers "Review of Radiocarbon Dates from Tikal and the Maya Calendar Correlation Problem" in order to avoid confusion with previous publications. I do not feel that this is terribly important so that if you prefer to delete "Review", that is all right with me.

Sincerely yours,

EKR:lm

Elizabeth K. Ralph



AMERICAN JOURNAL OF ARCHAEOLOGY

RICHARD STILLWELL, *Editor-in-Chief*

MCCORMICK HALL

PRINCETON, NEW JERSEY 08540

July 16, 1968

Dear Miss Ralph,

Here is the chart I am worried about: Khazineh, with no entries after it. I am also sending the galleys of Mr. Dyson's whole paper, in case they might be helpful. The proof of the whole symposium is just going to Miss Porada, but she, of course, will not know anything about this particular point. We will be very grateful for your advice.

Sincerely yours,

Worcester I. Smith
Mrs. E. Baldwin Smith
Assistant Editor

Miss Elizabeth Ralph
University Museum
33rd and Spruce Sts.
Philadelphia, Pa. 19104

July 17, 1968

Mrs. E. Baldwin Smith
American Journal of Archaeology
McCormick Hall
Princeton, New Jersey 08540

Dear Mrs. Smith:

After checking the Smithsonian Date List IV (See Xerox), we are quite sure that Khazineh is just the term for sample C₁. Therefore, it is all right as it appears in the chart.

We are wondering, however, about the title of the chart. Should it not be "Additional C-14 Dates" without the "As Available" since the dates are now available in the chart?

Sincerely yours,

EKR/rs
Encls.

Elizabeth K. Ralph



AMERICAN JOURNAL OF ARCHAEOLOGY

RICHARD STILLWELL, *Editor-in-Chief*

MCCORMICK HALL

PRINCETON, NEW JERSEY 08540

July 19, 1968

Dear Miss Ralph,

A great many thanks to you for the prompt answer about Mr. Dyson's chart - I feel MUCH better, there is nothing like having an expert on the other end of the phone. As to your suggestion about the title, it sounds perfectly reasonable, but I think we'd better leave it the way it is, since the chart came straight from Mr. Dyson that way. Thank you again, and I am enclosing your postage.

Sincerely yours,

Nancy H. Scheer

Mrs. E. Baldwin Smith

Assistant Editor

Technical Services

February 22, 1966

Dear Mr. Clem:

I have just been talking to Mr. Bullitt *about* our plans of excavation at the site of ancient Sybaris in south Italy, and he asked me to request a further study by your people on the possibility of using bentonite to solve our problems of water seepage.

Is there anyone in this vicinity from your company who has practical technical experience with the use of bentonite *who* could come in and go over the matter with me. If it is possible to use this under the circumstances, at Sybaris, we would then like to *discuss* with you an experiment at the site.

Most sincerely yours,

Froelich Rainey
Director

Mr. Arthur G. Clem
American Colloid Company
5100 Suffield Court
Skokie, Illinois 60077

FGR/vg

AMERICAN COLLOID COMPANY

Producers of Volclay and Panther Creek Bentonite

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BELLE FOURCHE, SO. DAKOTA
UPTON, WYOMING

GENERAL OFFICES
5100 SUFFIELD COURT
SKOKIE, ILLINOIS 60077
AREA CODE 312
TELEPHONE YO 6-5720
CABLE ADDRESS "VOLCLAY"

3 March 1966
(Dictated 3/2/66)

University of Pennsylvania
The University Museum
Thirty-Third and Spruce Streets
Philadelphia, Pennsylvania 19104

Mr. Froelich Rainey, Director

Thank you for your letter of February 22nd, Mr. Rainey.

Within the next few weeks, several members of our organization skilled in the making of slurries for slurry trench will be in the East. As soon as a positive trip has been arranged, we will make an appointment with you for a discussion of the slurry trenching at the Sybaris excavation.

The program is actually quite simple. It is called slurry trenching and is described on Page 13 of the enclosed booklet. A trenching machine begins its dry digging through the soil. After the excavation has begun, a slurry of about one-half pound to three-quarters pound per gallon of Volclay in water is fed into the trench. The excavation continues with the dirt that is removed being replaced by added slurry. When the trench has been completed, the slurry is then displaced with local clay to form a clay core sheet in the path of the water to prevent seepage.

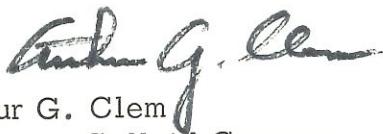
Contractors capable of digging such trenches exist all over the world. The only thing you need is a very simple method of mixing Volclay bentonite and water. This is covered on Page 18. The Colloid mixer, our preference for this type of work, can batch mix a thousand gallons of slurry in about 10 minutes of mixing time. By adding a granular feeder, and a constant overflow, the equipment can run continuously with only limited attention from a semi-skilled operator.

This paints the broad picture. Our representative will be prepared to detail this application and to offer suggestions as to how this can be done in southern Italy.

Continued

3 March 1966
University of Pennsylvania
Page Two

But we certainly appreciate your interest in our product.

A handwritten signature in dark ink, appearing to read "Arthur G. Clem". The signature is written in a cursive style with a prominent initial "A" and a long, sweeping tail.

Arthur G. Clem
American Colloid Company

AGC:eg

Encl: Data No. 229

Effective
**WATER
STOPPAGE**



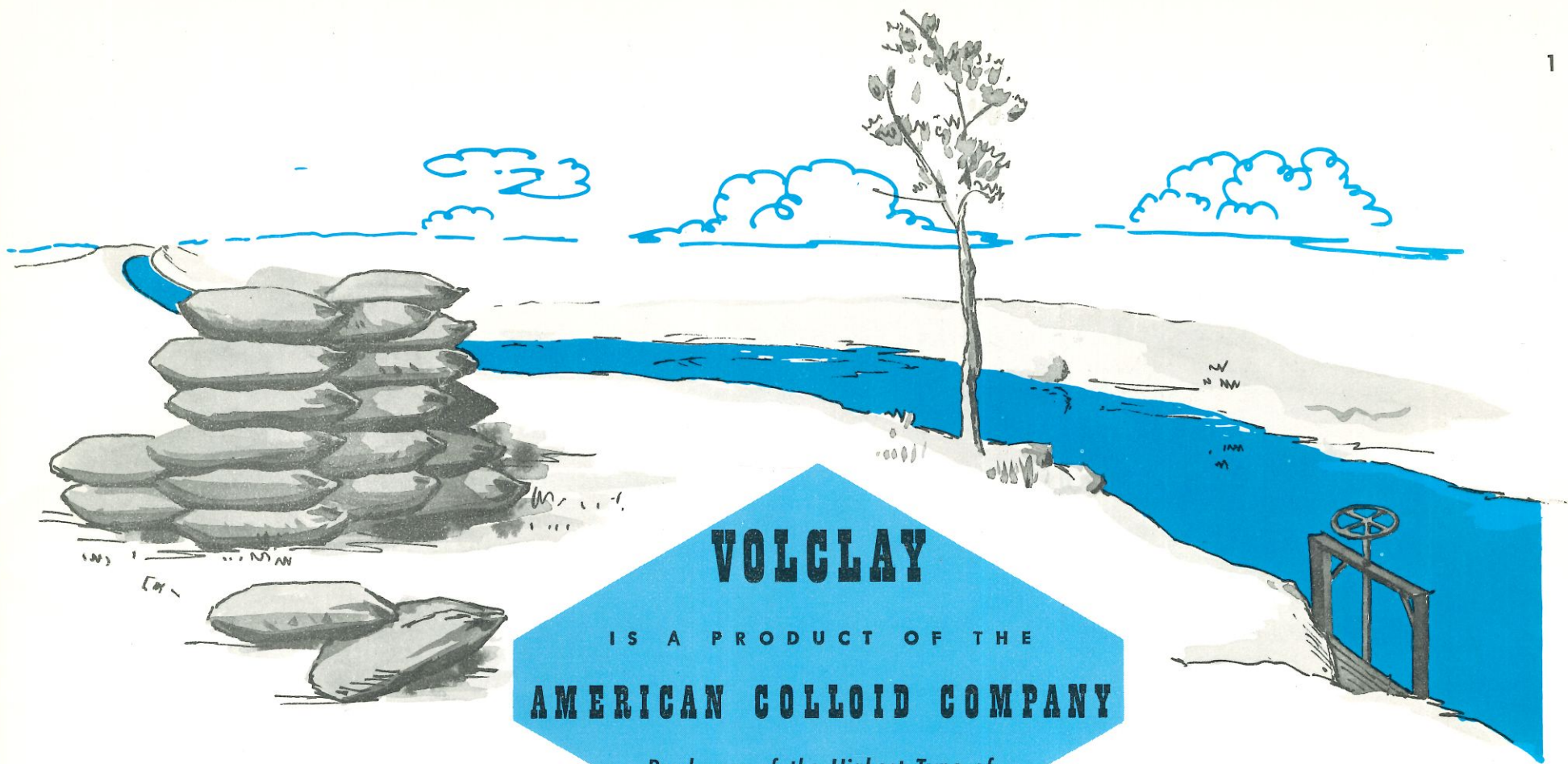
featuring
VOLCLAY

Legend says that an intelligent, clear-thinking Dutch boy, by plugging the dike with his hand, saved Holland.
. Today, intelligent, clear-thinking engineers are also effectively stopping water. But they are using

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- Ponds
- Lakes
- Reservoirs
- Stock Tanks
- Swimming Pools
- Dikes
- Dams
- Cofferdams
- Canals
- Ditches
- Pipelines
- Sewer Lines
- Bulkheads
- Mines
- Joints
- Cracks
- Foundations
- Basements



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VOLCLAY Plants

UPTON, WYOMING • BELLE FOURCHE, SOUTH DAKOTA

Other Plants

ABERDEEN AND WHITE SPRINGS, MISSISSIPPI • GASCOYNE, NORTH DAKOTA

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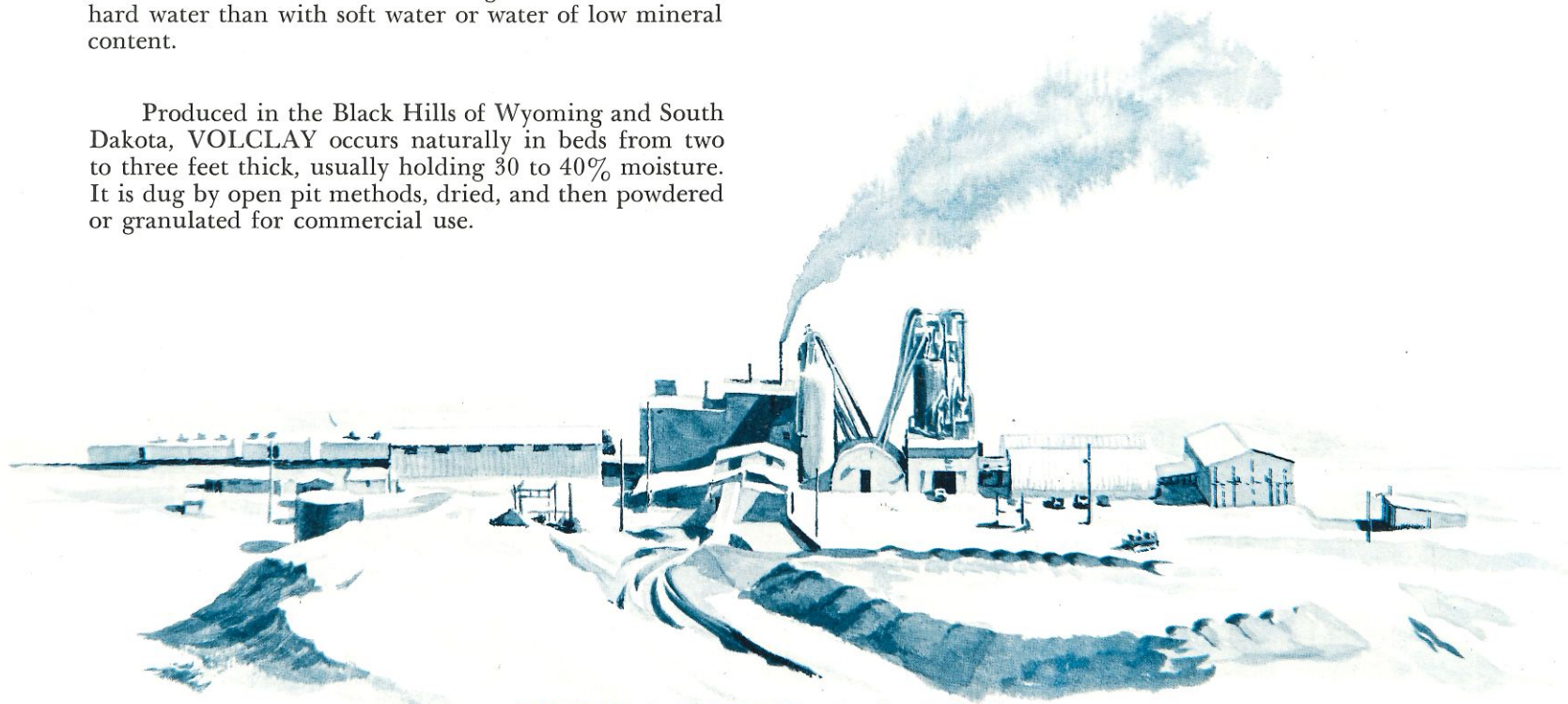
WHAT IS VOLCLAY?

VOLCLAY is a special kind of bentonite clay. It has practically the same chemical constituents as other clay substances but it has a unique molecular structure which accounts for its remarkable ability to absorb many times its own weight of water and to swell enormously in the process — the increase at full wetting ranging up to 15 times its dry bulk.

VOLCLAY bentonite's swelling ability is reversible; it can be dried and reswelled an infinite number of times. It will exhibit less swelling when wetted with hard water than with soft water or water of low mineral content.

Produced in the Black Hills of Wyoming and South Dakota, VOLCLAY occurs naturally in beds from two to three feet thick, usually holding 30 to 40% moisture. It is dug by open pit methods, dried, and then powdered or granulated for commercial use.

VOLCLAY is inert except for a light alkalinity, containing only an occasional trace of organic matter. It is harmless to the human system, having been used for many years in varied applications ranging from an ingredient in medicines to a filtering agent for wine and drinking water. It imparts no taste or odor to water and exerts no harmful effect upon plant or animal life.



VOLCLAY plant at Belle Fourche, South Dakota

HOW VOLCLAY WORKS

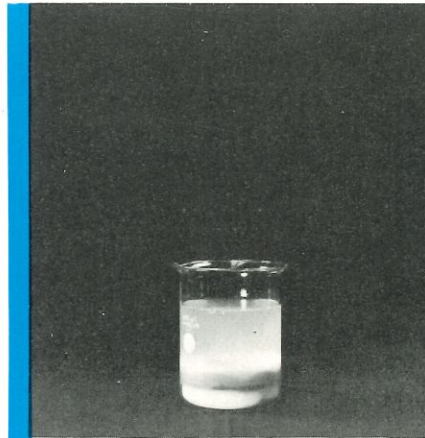
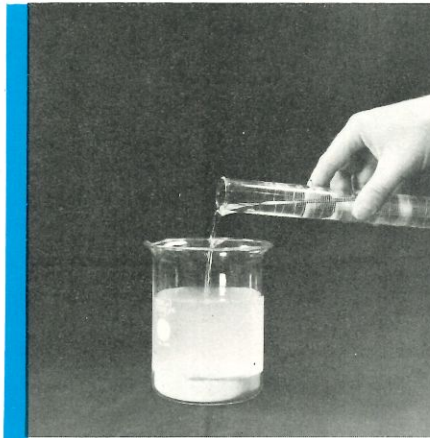
Each small grain of dry VOLCLAY is an aggregate of millions of smaller particles. When sprinkled very slowly into water, these grains of VOLCLAY avidly draw water into their sponge-like structures, causing each grain to expand like an accordion. When wetted in this manner and then stirred, a single cubic inch of dry VOLCLAY will separate into more than 9,500,000,000,000 extremely small plate-like particles, each flake surrounded by a hull of "bound-water." Thus, if VOLCLAY is allowed to satisfy its thirst for water, it swells.

Under confined conditions, such as when VOLCLAY is placed dry as a buried membrane or admixed with a pervious soil, the swelling of VOLCLAY will be retarded and the passage of water impeded. On contact with water, the grains at the surface of the confined

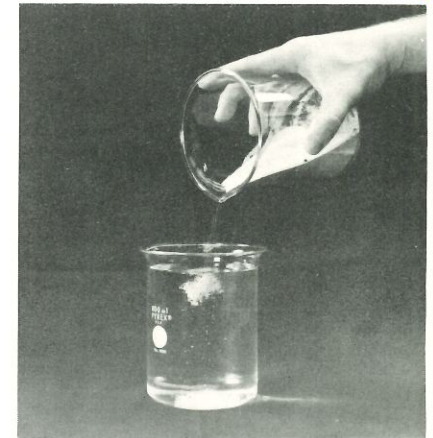
mass of VOLCLAY will swell, pressing more tightly against their neighbors, and the swollen grains will reduce the amount of water that can reach the next layer of grains, not allowing them to satisfy fully their thirst. Beyond that layer, the VOLCLAY will be practically dry with its capacity for swelling held in reserve.

VOLCLAY never permanently sets or hardens; it has existed underground in its present mineral form for many thousands of years. Its flexible, expanding, and self-sealing properties are important advantages of VOLCLAY when used for water impedance purposes. These properties are especially important in situations where foundation cracking, such as caused by uneven settlement, earth tremors, or faulty sub-grade materials, can develop after placement of the VOLCLAY barrier.

Slight wetting (or swelling) results when water is poured on VOLCLAY.



Maximum wetting

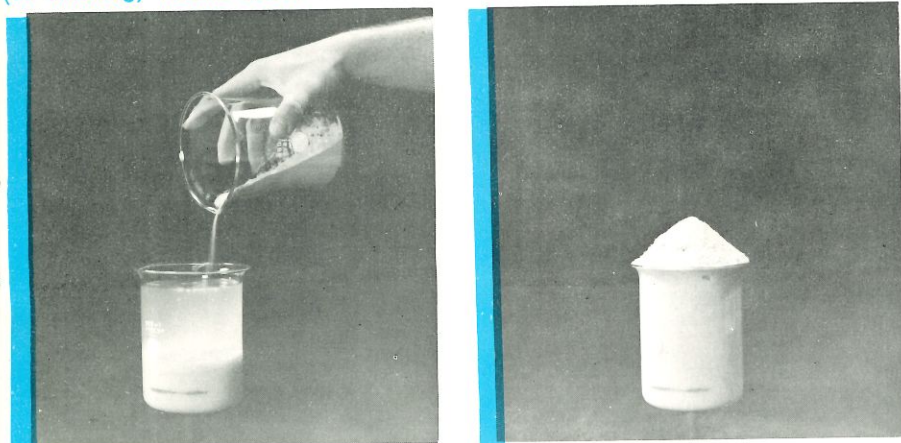


HOW TO USE VOLCLAY

In contrast to the dry-layer-use just described, VOLCLAY can be employed satisfactorily in an entirely different way. In some instances, a wet method is necessary or advantageous — for example, in sealing a leaky pond that cannot be drained or a leaky tank that is best sealed with water in the tank. The VOLCLAY is completely dispersed into the water, forming a milk-like mixture, in which the individual particles or flakes are separated. These dispersed particles have extremely small size that promotes the clogging and sealing of very small openings, such as hairline cracks or openings in porous concrete or fractured rock formations.

It has also been used in a thick gel-like consistency as a fluid for oil-well drilling and in water-impedance work, such as basement sealing.

(or swelling) results when VOLCLAY is sprinkled into water.



The use of bentonite such as VOLCLAY for water-impedance purposes has grown steadily in recent years, having been used in major structures, such as the cofferdams across the Columbia River during construction of Grand Coulee Dam and as cut-off trench material in Wanapum Dam, also on the Columbia River.

A few of the applications of this unique and useful material are outlined in this bulletin. If you have questions not answered by this information, remember that our Engineering Department is always glad to offer advice based on many years of experience. Send us all possible data concerning your seepage problem and we will answer promptly with suggestions and recommendations.

For large complicated seepage problems, we recommend that you obtain local engineering help in addition to the assistance we can provide.

Where possible, VOLCLAY used for sealing leaky materials should be placed in dry form. In this way, its swelling and self-sealing potential is best utilized. This is not always feasible; therefore, wet placement methods are sometimes necessary.

See page 20 for simple tests that demonstrate how VOLCLAY works.

SEALING CANALS AND PONDS

Surface Preparations If possible, drain the canal or pond to be sealed with VOLCLAY. Clean or remove obstructing deposits of sand, silt or vegetation. Add gravel, rock or coarse sand to stabilize eroding or cutting areas of the banks or bottom. Level and smooth with a drag. Before spreading VOLCLAY, wait until the surface soil is dry.

Not all these steps are possible in every case; complete as many as possible. Ignoring the need for such work will shorten the life and decrease the effectiveness of the seal produced with the VOLCLAY.

Use of Filler Material Fill large holes and crevices in the bottom or banks with a mixture of VOLCLAY and a sandy silt filler. Mix the VOLCLAY into the filler soil before placement in the holes or crevices. Use about 1 part of VOLCLAY to 5-10 parts of a sandy silt soil (by weight). This mixture may be applied (1) in holes and crevices, (2) as a blanket material over coarse rocky materials with not less than a 1-inch layer thickness, or (3) as a mixture for multiple-dam applications where the mixture is washed into place.

How much to use The amount of VOLCLAY needed to produce a satisfactory sealing will vary with conditions. Minimum application rates for several of the most common leaky soils are tabulated below:

Soil Type	Most Favorable Method of Application	Minimum VOLCLAY
		Application Rate lbs. per sq. ft.
Fractured rock or gravel	Blanket of VOLCLAY-soil mixture	2.0
Clean Sand	Mixed blanket	2.0
Silty Sand	Mixed blanket	1.5
Sandy Silt	Mixed blanket	1.0
Clay	Pure blanket	1.0

Unusual conditions, such as excessively salty soils or depths of water greater than 10 feet, require minimum rates of VOLCLAY application greater than those listed above. See page 20 for testing to determine how much VOLCLAY to use.

In general, it is best to use a VOLCLAY grade of approximately the same size as the soil particles — granular grades for sandy soils and powder grades for clayey soils.

GENERAL INSTRUCTIONS

Protective Cover The need for a layer of cover material above the VOLCLAY layer will vary widely with conditions. Bank and bottom areas must be protected that are subjected to:

1. high water velocities
2. wave-cutting
3. wading or burrowing animals
4. fluctuating water depth
5. active root growth

The depth and character of cover material will vary with the severeness of the disturbing actions. In silty to sandy soils, the water line is a critical zone requiring a protective layer above the VOLCLAY layer — usually a minimum of 6 inches of soil or rock. In contrast, the bottom area of a deep pond with constant water level will require little or no protective cover.

Annual Maintenance Be sure to remember the annual maintenance work. This is commonly neglected but it is important. It is best to set a definite time each year for the annual inspection — preferably at a time when the sealed area is dry or the water level is at its lowest level. Holes should be repaired, damaging growths of vegetation removed, and any other repair work completed.

**Keep several sacks of VOLCLAY on hand
for repair work.**



BLANKET METHODS (for canals and ponds)

Spread the VOLCLAY evenly over the leaky area. This can be done in several ways. One common method is to mark the area off in squares and place one bag (100 lbs.) of VOLCLAY in each square. The size of square will vary with the application rate as shown below:

Application Rate	1 Bag (100 lbs) Per Square	Approx. Thickness	Tons/Acre
2.0 lbs/sq ft	7' by 7'	5/16-in.	44
1.5 " "	8' 2" by 8' 2"	1/4-in.	33
1.0 " "	10' by 10'	3/16-in.	22

A grain drill or a fertilizer spreader can also be used to spread the VOLCLAY on or within the soil at the desired rate of application. Mix the VOLCLAY thoroughly into the top 3 or 4 inches of soil with a disc, spiketooth harrow, rotary hoe or hand rake. This is the

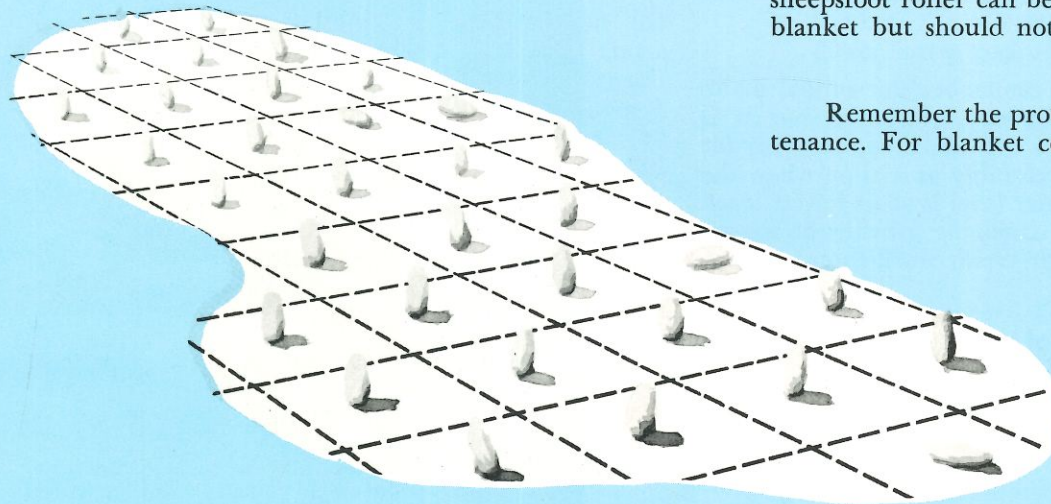
mixed blanket method

For some clayey soils the mixed blanket method may be impractical because of sticky conditions when the soil is moist and the formation of hard clods upon drying. In this case, clear and smooth the moist soil. Compact it as much as possible and apply the VOLCLAY as a surface layer but do not attempt to mix it into the clay soil. This is the

pure blanket method

Compact firmly, the mixed or pure blanket of VOLCLAY, with a smooth roller or clod breaker. A sheep'sfoot roller can be used for compaction of a mixed blanket but should not be used on a pure blanket.

Remember the protective cover and follow-up maintenance. For blanket coverage data, see page 21.



MULTIPLE-DAM METHOD (for canals)

The Multiple-Dam Method works best in gravelly to rocky canals that are stable (no cutting of banks or bottom).

Use a mixture of VOLCLAY and filler soil (see page 6). Place this mixture as dams in the dry canal. Space the dams so that water can be ponded slightly above the normal high water line throughout the interval between the dams.

Wash the mixture into place by turning a small flow of water into the canal. As the first dam is overtopped, help the break-out process. Repeat the operation at each successive dam. Keep the slurry ponded as long as possible behind each dam.

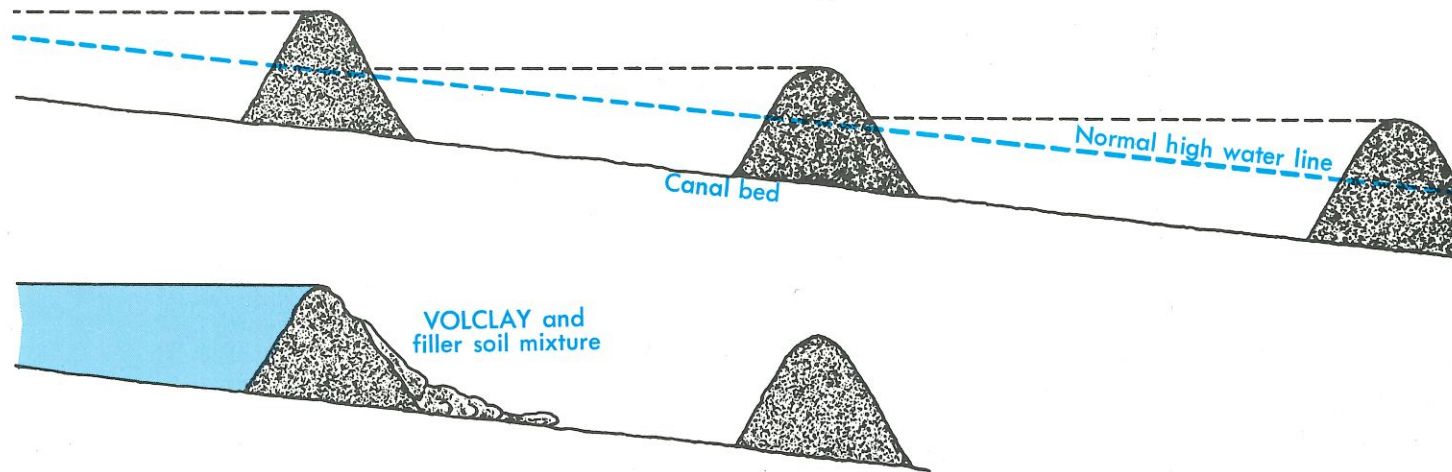
DITCHER METHOD (for canals)

The Ditcher Method works best in sandy canals that have a flat grade and that are cleaned regularly with a V-ditcher.

Place the VOLCLAY along the bottom of the newly cleaned ditch. Pull the V-ditcher through the ditch section until the VOLCLAY is mixed thoroughly into the top 2 inches of soil.

Subsequent cleaning of the canal with a V-ditcher will renew the seal — provided the depth of cleaning is carefully regulated to a shallow skimming.

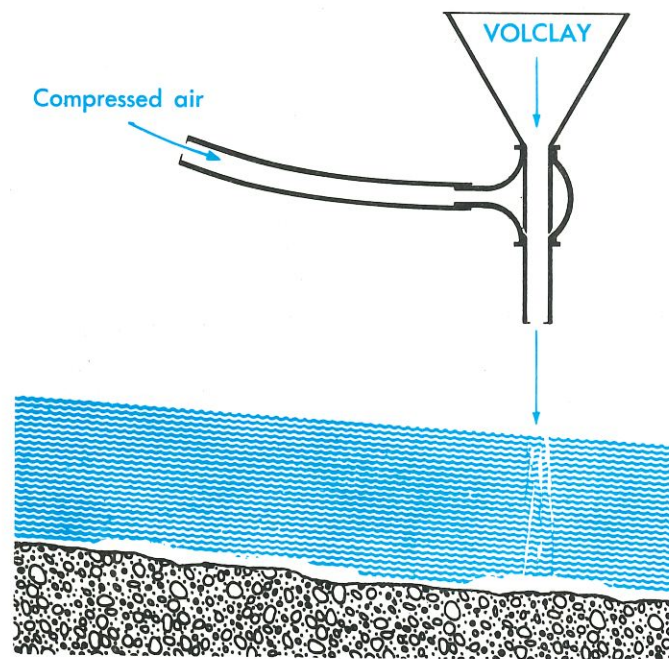
In addition to the sealing benefits, this treatment will help in stabilizing cutting banks.



SPRINKLE AND DISPERSION

If it is impossible or infeasible to drain the leaky canal or pond, VOLCLAY may be used in wet placement methods. The wet methods will require less labor, in some instances, than the dry placement and no more VOLCLAY; indeed less if the leaky spots can be located early in the treatment. Commonly, however, the results are uncertain — especially when the leaky materials are hidden by water, making impossible direct examination and treatment.

Too much penetration can be a problem. In coarse rocky or gravelly materials, the dispersed VOLCLAY particles may be too small — silt and sand sizes in combination with VOLCLAY may be needed to plug and seal large openings and cracks.



In fine silty materials, lack of penetration or surface sealing may be a problem. The surface coating of VOLCLAY is vulnerable to cracking upon drying, removal by water erosion, or puncturing by burrowing or wading animals. To increase the life of a seal, underwater harrowing has been used. Placing a protective layer of gravel or rock in the unstable areas, such as the high water line zone has also been effective, if placed before using the sprinkle or dispersion methods.

How Much to Use — If the leaky canal or pond soil is a clay, sandy silt, silty sand, or clean sand, use the VOLCLAY application rate from the table on page 6. If it is a rocky or gravelly material, start with 2.0 lbs./sq. ft. of surface area and use with a filler material. Increase this rate, if needed, to produce a satisfactory sealing effect.

How to Apply It — The VOLCLAY may be spread by (a) sprinkle methods, or (b) dispersion methods.

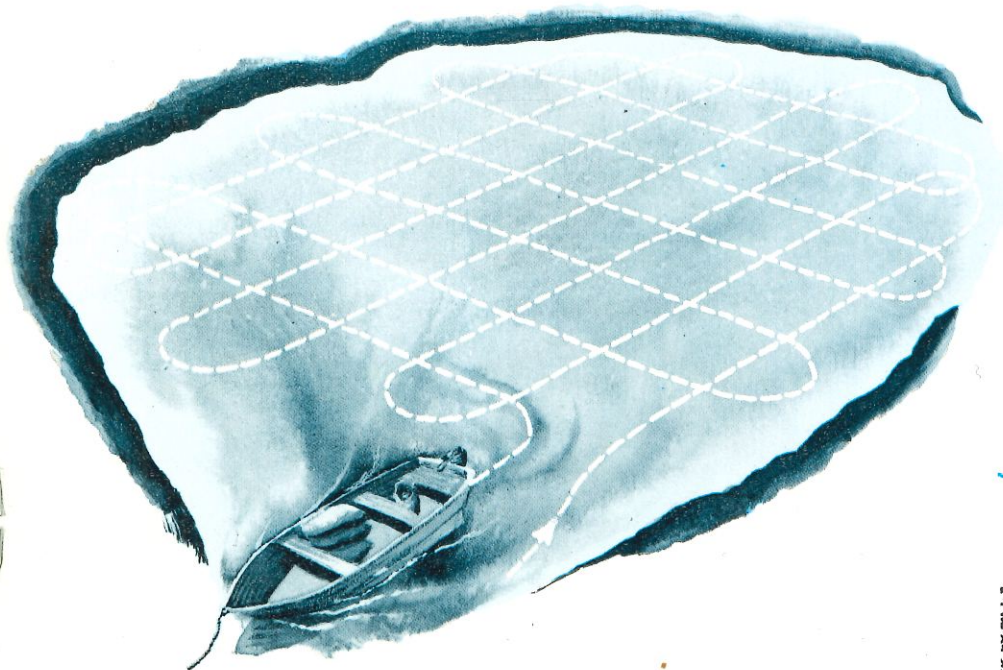
In the **sprinkle methods**, the VOLCLAY is either sprinkled from a boat or blown into the water above the area to be treated. For this work, it is best to use one of the free-flowing, dust-free, granular grades of VOLCLAY (KWK or No. 90). VOLCLAY, D and C (dried and crushed) is also used since it is the most economical grade, but it is not dust-free.

In the boat method and in small ponds, ropes may be used to mark off the application squares for each 100-lb. bag of VOLCLAY. On large jobs, a sand blaster, a machine that throws sand by air pressure, may be used

METHODS (For Canals and Ponds)

to eliminate the job of hand spreading or sprinkling from a boat. The stream of granular VOLCLAY is directed over the pond in a regular pattern for 100% coverage of the desired areas.

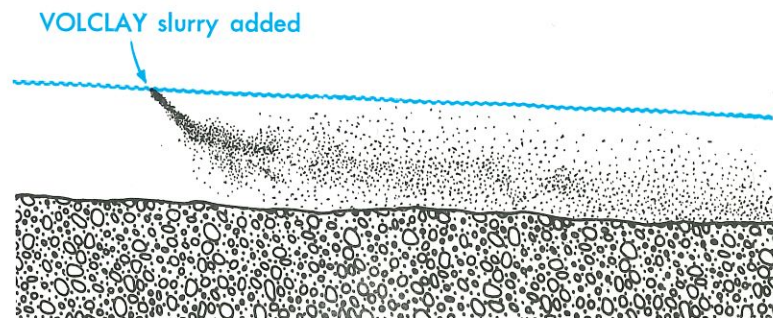
In the sprinkle methods, the granules of VOLCLAY sink to the bottom, forming a gel which is drawn into and seals the leaky zones. In still water, the gel layer will remain undisturbed but flowing water or wave turbulence will disperse it.



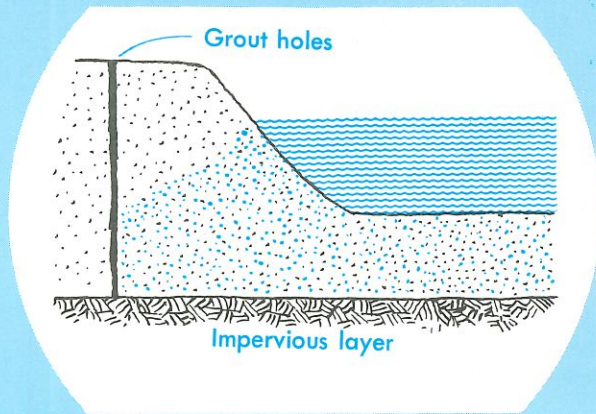
The sprinkle methods may be used in canals by adding the VOLCLAY into the flowing water upstream from the leaky zones.

In the **dispersion methods**, the VOLCLAY is dispersed in water, forming a gel or slurry which is then pumped into the leaky canal or pond. (See pages 18 and 19 for mixing instructions and page 21 for quantities to use). For pond applications, the slurry is discharged along the sides and under the clear pond water in a pattern covering all suspected leaky zones. For canal applications the slurry (4-8% VOLCLAY) is diluted with canal water (to 1-2% VOLCLAY). The diluted mixture is then routed through successive ponded reaches of canal being treated.

Annual Maintenance — Be sure to remember the annual inspection and maintenance work. A small follow-up treatment each year is needed — especially in canals or ponds that dry-out and freeze during the winter. Hard water has a shrinking effect on swelling clays. This also will increase the need for annual maintenance of the VOLCLAY seal.



CUT-OFF WALL METHODS



Cut-off wall methods may be used to control seepage loss occurring (1) beneath a large dam, (2) through a reservoir rim or dike, and (3) into an excavation, tunnel or mine.

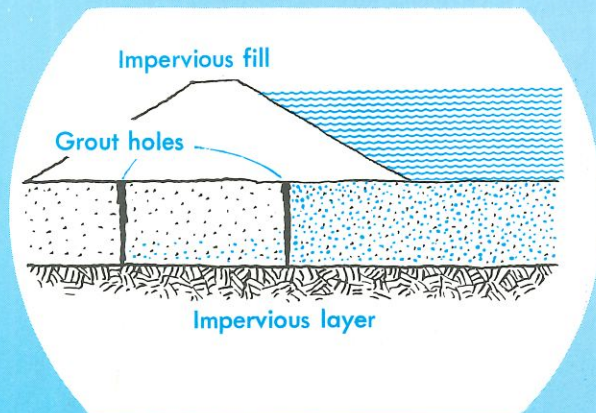
Two common cut-off wall methods are —

- Injection or pressure grouting
- Slurry trenching

In grouting, the grouting mixture is injected into leaky zones (or into zones to be consolidated) with a mud pump through drill holes. Where seepage control is the main objective, it is especially advantageous to use VOLCLAY as the primary grouting material, or as an additive to Portland cement or chemical grouts.

A VOLCLAY grout will penetrate finer-grained materials than a cement grout. It also can be used as a low-cost material to seal large openings.

Thick mixes can be produced with relatively low concentrations of VOLCLAY.* A 3% mixture ($\frac{1}{4}$ lb. of VOLCLAY per gallon of water) is a very thin cream. A 12% mixture (1 lb. VOLCLAY per gallon of water) has the consistency of lubrication grease.



The thickness and smoothness of the grout is determined by the formation into which it is to be pumped. The more open the formation, the higher the concentration and the more lumps of sand and unswelled VOLCLAY the grout can contain; conversely, as the openings in the formation become smaller so also must the grout be smoother and thinner. Chemicals can also be used to adjust the thickness. A strong acid, or one of its salts, may be used to coagulate the mixture. Dispersants, such as polyphosphates, may be used to thin the mixture.

* See pages 18 and 19 for mixing instructions.

(For Reservoirs)

The formation to be sealed is also one of the factors influencing the spacing of grout holes — the tighter the formation, the closer the hole spacing.

As an additive to a cement grout, VOLCLAY improves the grouting mixture by —

1. increasing the stability, fluidity, penetration qualities
2. increasing the adherence to the walls of cracks and voids
3. decreasing the unit cost of the grout

The slurry trenching method utilizes VOLCLAY bentonite with water as the slurry.

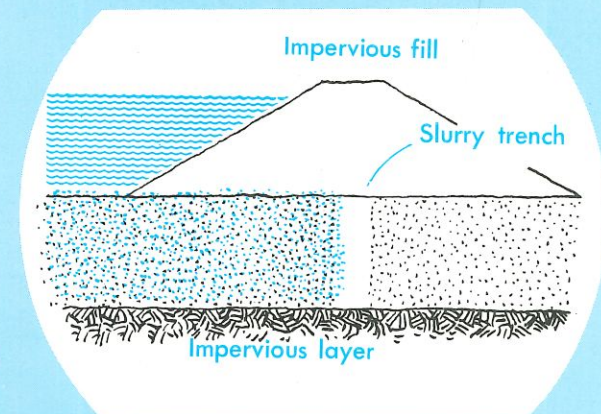
In this method, the trench is kept full of slurry during excavation. The important advantage of this method is that vertical side walls can be maintained during excavation, without sloughing or caving. This is especially significant when a cut-off wall is dug into fine-grained sandy materials below the water table.

The excavated materials, if sufficiently coarse, are pushed back into the VOLCLAY-filled trench.

Where this method is feasible, large savings in cost may be achieved over conventional cut-off trench methods into wet materials.*

A similar method has been used for many years in boring holes in unconsolidated sands, silts, and clays for caissons or wells. The hole is kept full of VOLCLAY gel during the boring or drilling. This keeps the hole from caving or sloughing. In many cases, it takes the place of casing for the hole.

* See Engineering News-Record, February 11, 1960, pp. 42-46.



SEALING CONCRETE STRUCTURES

VOLCLAY is an excellent, long-lasting waterproofing material that can be applied as a layer:

- beneath the floor slab before it is poured
- on the outside of the walls before back-filling

VOLCLAY Impedance Panel (VIP)



Slab Waterproofing

Before pouring the floor slab, place VOLCLAY by one of the following methods:

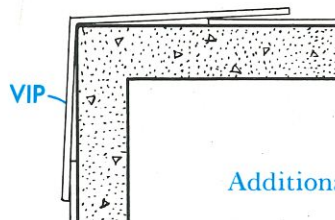
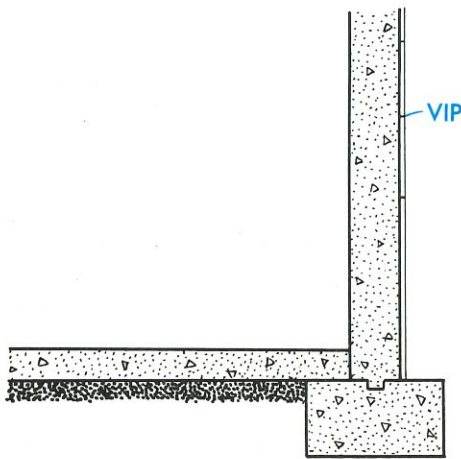
- Mixed blanket
- Pure blanket

Use the methods outlined on pages 6 and 8; be certain to compact the subgrade thoroughly after placing the VOLCLAY. Before pouring the floor slab, place a 1-inch layer of sand or gravel above the VOLCLAY.

Wall Waterproofing

VIP (VOLCLAY-impedance-panel) is the most convenient way to waterproof walls. It is a sheet of corrugated paperboard filled with VOLCLAY, 16 x 48 inches in size and almost 1/4-inch thick. Without the weight of the paper, there is almost one pound of VOLCLAY per square foot of panel. One panel covers 5.33 square feet; 15 panels (one bundle) covers 80 square feet.

With VIP, the contractor can cover the exterior of a concrete foundation with a continuous barrier of dry, unswelled VOLCLAY, assuring freedom from seepage. The paper package, underground, will probably rot away in a few months, but the VOLCLAY layer will remain effective almost indefinitely.



Additional information on VIP is available on request.

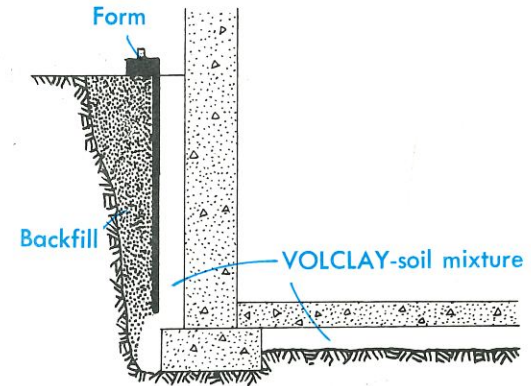
DURING CONSTRUCTION

Additional Wall Waterproofing Methods

A mixed blanket of VOLCLAY with dry soil or sand may be placed against the wall by using a separator of sheet metal or hardboard, etc., and performing the backfill and the blanket placement operations simultaneously, sliding the separator upward as the filling operation proceeds.

A pure blanket of VOLCLAY may be applied by plastering bentonite gel onto the outside surface in layers from 1 to 1.5 inches thick. One hundred pounds of VOLCLAY will cover approximately 80 square feet of wall. The backfilling operation should be done while the gel remains moist and adheres to the wall.

A pure blanket also may be applied by wetting the wall first and casting dry VOLCLAY against it. A film will adhere to it. This process is repeated until the VOLCLAY layer is built to $\frac{1}{2}$ to 1-inch thick.



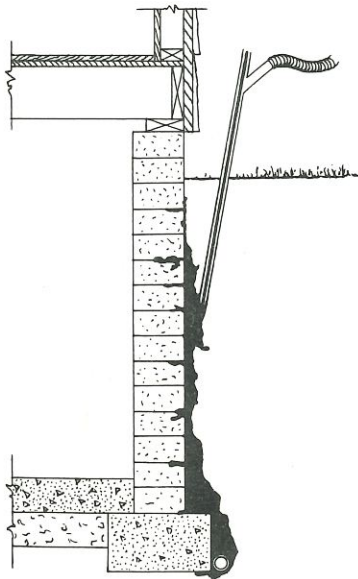
SEALING CONCRETE STRUCTURES

Leaks in concrete and masonry structures commonly are caused by —

- Cracks and joints
- Open pores in the concrete or masonry

VOLCLAY is an effective and economical remedy for both of these conditions. It can be used as a grouting material in the soil materials on the outside of the structure. It is also useful for caulking cracks and joints from the inside of structures, not only in concrete but also in wood, metal, tile and other construction materials.

Grouting Method

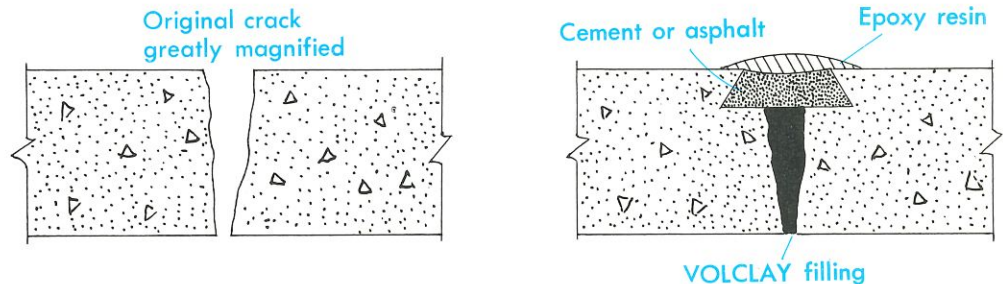


In this method, VOLCLAY gel is injected into the suspected leaky soil zones on the outside of the wall to be waterproofed. Drill holes, usually from 1 to 2 feet apart and as close to the wall as possible, are used for the injection. No excavation is needed in this method so that disturbance of the ground surface adjoining the structure is kept to a minimum. See pages 18 and 19 for mixing instructions.

Caulking Method

For small cracks and joints on horizontal surfaces, place $\frac{1}{2}$ to 1 inch of dry VOLCLAY in the cleaned crack. Cover it with a plug of cement and epoxy resin or some other material that will keep it in place. In large cracks or fissures, fill the crack with a mixture of one part of VOLCLAY to one part of sand. This also must be protected with a cover of epoxy resin, cement or tar to keep it in place.

For cracks and expansion joints in vertical walls, it is difficult to place a dry powder. Pastes of VOLCLAY and water can be used as the crack filler, but it is best to use a non-shrinking paste. To obtain this, mix three parts of VOLCLAY to two parts of a neutral organic solvent such as denatured alcohol, isopropyl alcohol, diethylene glycol (Prestone), gasoline, kerosene, glycerin, naphtha or benzine. The ratio of solvent to VOLCLAY may be reduced to form a heavier putty. The paste is packed in the cracks or expansion joints and held in place by a finishing coat of mastic compound or cement and epoxy resin. Other non-volatile liquids, such as linseed oil, and natural and synthetic resins, may also be used.

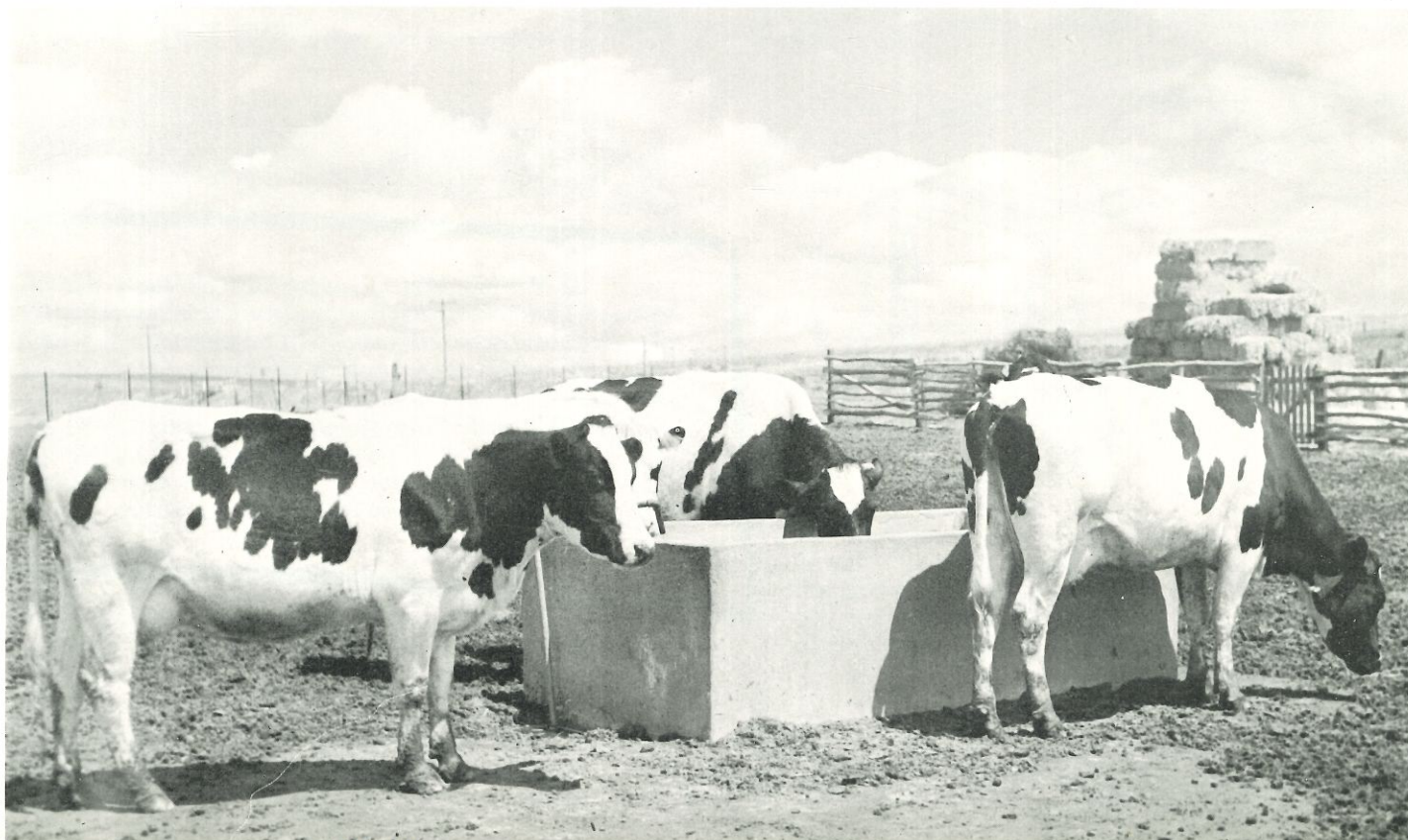


AFTER CONSTRUCTION

Seepage Method

For stopping seepage from concrete tanks and reservoirs, VOLCLAY may be applied from the inside with the tank full of water. Disperse the VOLCLAY in the water to form a 1% suspension, agitate to distribute the initial suspension throughout the water in the tank. The tiny suspended VOLCLAY particles will seek out and clog the leaky pores. If the seepage is not greatly reduced within two or three days, the concentration should be increased. See pages 18 and 19 for mixing instructions.

Where the leakage is known to be only through the bottom of the structure, simply sprinkle granulated VOLCLAY on the surface of the water when the tank is full. The VOLCLAY will disperse while sinking to the bottom and be drawn into the seepage pores by the seepage loss water. In cases where the walls leak and it is not feasible to disperse VOLCLAY in the water, the structure may be treated by draining, painting the walls with a gel consisting of 8 to 9% VOLCLAY in water, and then immediately refilling. Repeat this procedure several times if necessary.



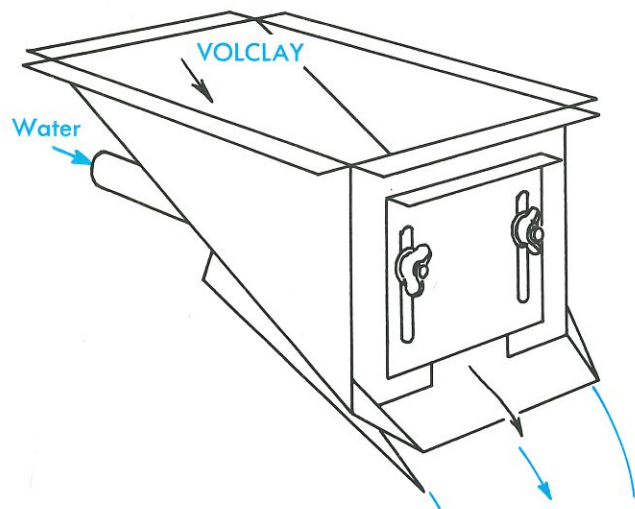
HOW TO MIX VOLCLAY

Colloidal bentonites, particularly VOLCLAY with its high swelling properties, are more difficult to mix with water than ordinary clays, but the mixing problem may be simplified by use of proper grades and methods.

VOLCLAY is available in both powdered and granular grades. In general, the granular grades are much easier to mix into water than the powdered grades. KWK VOLCLAY is easiest of all grades to mix into water.

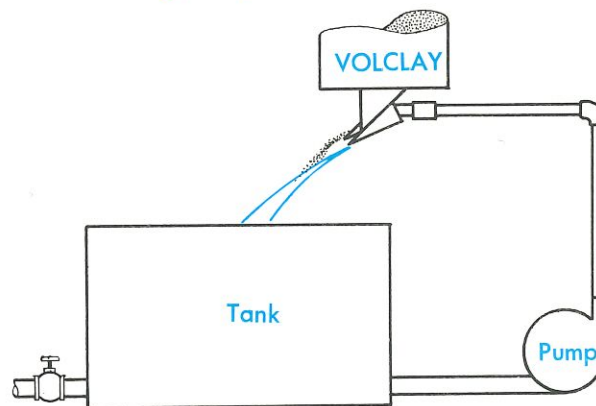
Granular Feeder

The granular grades of VOLCLAY (KWK, No. 55 and No. 90) can be wetted, conveniently and rapidly, by use of a granular feeder as shown below:



With this device, water is discharged as a thin sheet at rates of 5 to 50 gallons per minute. Free-flowing granular VOLCLAY falls onto the sheet of flowing water, wetting almost instantly into a uniformly wetted mass.

Recirculating Pump Method



High capacity pumps can be used in recirculation methods for mixing large volumes of VOLCLAY slurries. One especially efficient recirculation method is pictured above.

The Colloid Mixer consists of a specially designed cone, a large centrifugal pump, and a recirculation line. The pump discharges from a line tangent to the top of the tank, imparting a circular motion to the water. The VOLCLAY is poured slowly into the water vortex where it is wetted, sucked into the pump and recirculated. The capacity of the tank is 1,000 gallons of 0.6 to 0.8 pounds of VOLCLAY per gallon of water. The mixing time is about 10 minutes per 1,000 gallons of mixture.

A propeller-type agitator, such as the Lightning Mixer, may be used in combination with a pump recirculation method or by itself as the primary mixer.

FOR SEALING PURPOSES

Miscellaneous Methods

Various kinds of jet devices may be used for mixing VOLCLAY slurries. Information regarding jet mixers will be furnished upon request.

When mechanical mixer equipment is not available, VOLCLAY KWK is fastest and easiest to use. Simply fill any convenient size vessel with water at room temperature. Slowly sift the required amount of VOLCLAY KWK into water. Allow it to soak for 10 to 15 minutes. Then, with a paddle, stir with a lifting motion until the mixture is smooth. By this means VOLCLAY suspensions of 1 to 20% can be made using no mechanical agitation.

Most methods for making thick paste will not yield perfectly smooth dispersions. There will be lumps of wetted but not fully hydrated particles. These lumps may be smoothed out by one pass through a heavy pump such as is used to handle greases.

Powdered VOLCLAY can also be used to create small batches of suspension. The best method is to fill the vessel to the proper level with water. Sprinkle a little powdered VOLCLAY on the surface and allow to stand until the powder has become fully soaked and has settled. Repeat this procedure until all of the VOLCLAY is in suspension. The limit by this method is about 7 to 8% VOLCLAY in water.

General Hints

Mixing VOLCLAY in hot water accelerates the results, but it is not essential. When KWK is added to very hot water, the swelling is so rapid that the vessel quickly becomes filled with gel, limiting the proportion of the VOLCLAY that can be added.

When vigorously mixed so that every particle is wetted, VOLCLAY attains practically its full hydration within 10 minutes. Perfect mixing, however, is seldom achieved in a few hours; up to 24 hours soaking will complete the swelling of the particles that were not fully hydrated initially.

Optimum speed and ease of dispersing is attained by using selectively-sized granular VOLCLAY, sprinkling it very slowly into water, and allowing it to stand a short while before stirring.

Remember to —

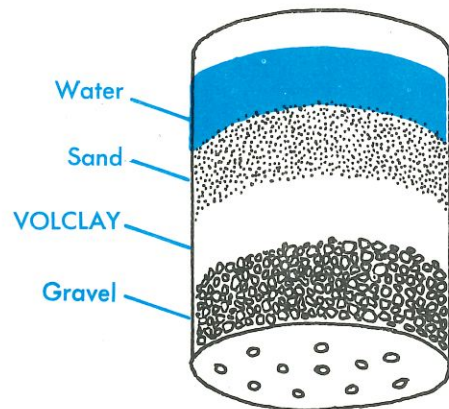
- Always add VOLCLAY to water — not water to VOLCLAY
- Always add the VOLCLAY to water slowly

THREE SIMPLE TESTS

1 Puncture the bottom of a can with a number of holes to make a sieve and cover the bottom with an inch of gravel or coarse sand. Water will flow through freely.

Now cover the sand or gravel with ½-inch of KWK VOLCLAY and put a layer of sand over it. Fill with water. It will not penetrate!

An earth-VOLCLAY mixture can be substituted for the straight VOLCLAY in the above experiment, and the result will be practically the same. In engineering works, mixtures are generally used because they are easier to place in a uniform layer.



through a certain soil, make the following tests: Perforate the bottom of a large pail, washtub, or 5-gallon can. Put in 6 or 8 inches of typical soil, tamp lightly, fill with water and measure the rate at which the water flows through the soil. Then repeat the experiment, but have the top 1½ inches treated with VOLCLAY. A good proportion to start with is to mix ½-pound of VOLCLAY with 9 pounds of dry soil and use this for the top layer. If this does not keep the water from flowing through, increase the percentage of VOLCLAY until a mixture is obtained that stops seepage completely.

After determining the minimum proportion of VOLCLAY which will stop seepage in this experiment, add 25% to 100% more VOLCLAY as a safety factor to allow for increased water pressure due to greater depth and loss through large scale mixing, which is seldom as thorough as mixing a small amount by hand.

2 To demonstrate how VOLCLAY stops the leaks in porous masonry, procure a piece of filter paper and a funnel. Place the filter paper in the funnel, fill with water, and observe the loss over an hour. Then disperse one level tablespoon of KWK VOLCLAY in one pint of water. Repeat the experiment substituting the 2% VOLCLAY dispersion just made and note seepage reduction. If filter paper is not available, a single sheet of newspaper may be placed inside a colander or large sieve and used instead.



3 For many years we have advertised that "VOLCLAY properly placed in the path of water always stops it; stops it immediately and stops it completely." Proper placement usually means that it has to be confined or at least protected from erosion. The following test will illustrate what is meant: Pour ½ pound of Powdered or KWK VOLCLAY in the center of a handkerchief or cloth of similar size. Draw up the four corners and tie a string tightly around the cloth just over the VOLCLAY so none of it will run out. Place it in a pail of water and let it remain for several hours or days, then remove the cloth and observe the condition of the VOLCLAY on the inside. The point it demonstrates is that the VOLCLAY was confined, even though by a very thin cover, and remained dry. Without this confinement, it would have diffused through the water. In practical use, VOLCLAY is confined when it is mixed with sand or soil, when a pure layer of it is covered with earth, and when it has been stuffed in a crack and covered.

When used according to the Sprinkle Method or several others for treating porous masonry, VOLCLAY is not confined in the initial application, but does become confined later within the pores of the leaky material.

Grades of VOLCLAY

	WEIGHT lb. per cu. ft.	VOLUME cu. ft. per 100 lb.	GRADE	AVERAGE DRY SIEVE ANALYSES	AVERAGE WET SIEVE ANALYSES FINER THAN:		
					200 mesh	20 microns	0.5 micron
SPV	54	1.85	powdered	75 to 90 % through 200 mesh	96%	93%	86%
KWK	67	1.49	evenly sized pellets for rapid dispersion	90% between 20 and 70 mesh less than 1% finer than 100 mesh	95%	90%	85%
MX-80 No. 90	66	1.52	fine, free flowing granular material with low fines content	75 to 90% between 40 and 160 mesh less than 5% finer than 200 mesh	95%	90%	85%
No. 55	67	1.49	slightly coarser than No. 90 or MX-80, free flowing, rapid hydrating	80 to 90% between 20 and 160 mesh less than 5% finer than 200 mesh	95%	90%	85%
D & C	65	1.54	dried, crushed and screened	80 to 90% between 4 and 20 mesh maximum 0.5% finer than 40 mesh	94%	90%	85%

CUSTOM GRANULAR — We can also produce granular sizings to customer specifications.

VOLCLAY is prepared by granulating, pulverizing, and air separating bentonite into the various grades which our customers have found best adapted to their needs. These are chemically unchanged.

Blanket Coverage Data

PROPORTIONS OF MIXTURE	THICKNESS (inch)	AREA COVERAGE (sq. ft.)		AMOUNT OF VOLCLAY REQUIRED (lb.)	
		100 lb. of VOLCLAY	one ton of VOLCLAY	100 sq. ft.	one acre
Pure KWK	¼	68.6	1372	144	63,525
20% KWK; 80% Soil	1	86.	1720	117	50,820
15% KWK; 85% Soil	1	139.	2780	88	38,115
10% KWK; 90% Soil	1	172.	3438	58	25,410
5% KWK; 95% Soil	1	344.	6879	29	12,705

Note: In place of KWK, grades of No. 90 and MX-80 may be used. The above figures for VOLCLAY-soil mixtures are based on layers 1 inch in thickness. Layers of two to six inches are recommended for best results

Mixing and Dispersion Data

PROPORTION OF VOLCLAY TO WATER (%)	AMOUNT OF VOLCLAY TO MAKE:			AMOUNT OF GEL OBTAINED FROM:			
	1 gal. gel (oz.)	1 cu. ft. gel (gm.)	1 cu. ft. gel (lb.)	100 lb. of VOLCLAY		1 ton of VOLCLAY	
	(gal.)	(cu. ft.)	(gal.)	(cu. ft.)	(gal.)	(cu. ft.)	(cu. ft.)
12	16.1	456	7.5	98	13	1958	262
10	13.4	380	6.3	118	16	2348	314
8	10.7	304	5.0	148	20	2935	393
6	8.0	228	3.8	196	26	3916	524
2	2.7	76	1.25	590	79	11740	1570
1	1.34	38	.63	1175	157	23475	3140



AMERICAN COLLOID COMPANY

5100 SUFFIELD COURT ● SKOKIE, ILLINOIS 60077

AMERICAN COLLOID COMPANY

Producers of Volclay and Panther Creek Bentonite

MINES & PLANTS

ABERDEEN, MISSISSIPPI
WHITE SPRINGS, MISSISSIPPI
GASCOYNE, N. DAKOTA
BELLE FOURCHE, S.D. DAKOTA
UPTON, WYOMING

GENERAL OFFICES
8100 SUFFIELD COURT
SKOKIE, ILLINOIS 60077
AREA CODE 312
TELEPHONE YO 6-8780
CABLE ADDRESS "VOLCLAY"

30 November 1965

Mr. Orville H. Bullitt
1517 Locust Street
Philadelphia 2, Pennsylvania

Mr. Bullitt, Roy Harris turned your letter of November 22 over to the writer for answer.

The answer to your problem may be found in Data 229, the colorful booklet on halting water seepage with Volclay. From your description, a slurry trench appears indicated around the outside of the foundation.

Slurry trenches have proven equally as popular in Europe as they have in the United States for seepage control and wall movement control at minimum cost.

A slurry trench is fairly simple to produce. You mix good quality Wyoming type Volclay bentonite with water in the form of a slurry of roughly 1/2 lb. to 3/4 lb. of Volclay per gallon of water. You then begin your trenching, and allow the Volclay slurry to replace the dirt that has been removed. The dirt can be excavated with any type of excavation equipment through the slurry and discarded.

When you have reached the proper depth, the slurry is allowed to remain intact. Since it is made of Volclay bentonite and water, the water cannot seep out and into the formation, even if it is sand or gravel. Since it is substantially thicker than water, water cannot seep through it. At ultra-low cost, you can maintain your excavation in dry form, far better and far cheaper than the traditional methods of using sheet steel piling for well-points.

There have been several booklets prepared on this approach. Would you like copies for yourself and for your staff? Let us know how many are needed and we will be happy to furnish them to you.

Arthur G. Clem
American Colloid Company

AGC:mcq

November 20, 1965

Techniques

Dear Dr. Corner:

Enclosed is the paper on "New Techniques on Archaeology" resulting from our Symposium. You will note that there is one line drawing on the thermoluminescence graph with a caption, attached. I hope this is all satisfactory for the publication.

I find I left two slides with the projectionist after my talk, and if they have turned up around there, perhaps your gift will send them up to me here at the Museum.

I enjoyed our conversation at the Wistar Party, which are always very pleasant affairs.

Very best wishes,

Froelich Rainey
Director

Dr. George W. Corner
Executive Officer
✓ American Philosophical Society
104 South Fifth Street
Philadelphia, Pennsylvania
19106

FGR/vg

enclosure

March 9, 1962

✓ Mrs. Thelma Pfenninger, Managing Editor
American Journal of Science Radiocarbon Supplement
Sterling Tower, Yale University
New Haven, Connecticut

Dear Mrs. Pfenninger:

C
O
P
Y
Thank you and Dr. Deevey for going over our Date List V so carefully. Before we have it retyped, there are a few things that we are wondering about.

- 1) If we switch to A.D. 1950 for B.P. dates and round out the 4th figure, wouldn't it be more consistent to round out the tolerance as well?
- 2) PP. 10 ff. in General Comment on Gordian series: We prefer to delete "unpub" for each sample since the dates have been published in the text of the ASA article and will appear again in this form. They must remain in "text form" since they are not representative of the times of construction. We feel that they should be included in this way as good examples of erroneous dates obtained from inner wood of large beams, p. 12, we disagree with your comment added at end of Gordian text. Dates for representative samples such as P-275, P-128, and P-134, as calculated with 5800 half-life, are in better agreement with archaeological estimates.

Wood identifications were not made on the samples in the text. This is a good suggestion, however, and we shall try to send some samples to Dr. Kukochka.

PP. 21, 22, should we round off dates for individual beams of Temples I and IV? This does make a significant difference in the average age of Temple IV. The average tolerance for these 10 beams from counting statistics alone was 16 years.

The changes that you have suggested for the Tikal Stratigraphic series are so extensive that Dr. Satter Thwaite and I thought it best to send a copy to Bill Coe who wrote this section. We hope to receive his reply from Tikal from March 19.

Do you mind if we retype the whole article?

Sincerely yours,

Elizabeth K. Ralph

AMERICAN PHILOSOPHICAL SOCIETY

held at Philadelphia
for Promoting Useful Knowledge

104 South Fifth Street
Philadelphia, Pa. 19106

November 16, 1965

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

Dear Dr. Rainey:

We are looking forward with great anticipation to publishing as soon as possible the Symposium on Archaeology held here last week. I noticed that you had a complete manuscript on the lectern and therefore am not embarrassed in urging you to let us have it as soon as possible, in the hope that we can publish the symposium during the coming spring. To those who projected lantern slides I may say that glossy prints of the pictures can be used for publication in reasonable numbers.

Sincerely yours,

George W. Corner

George W. Corner
Executive Officer

C/R/t

*Your paper was a much-praised and very
valuable contribution!*

71/5 KENNEDY CADDESİ
KAVAKLIDERE, ANKARA
TEL : 17 45 84

April 28, 1973

*Book sent airmail
May 4*

Elizabeth K. Ralph
University Museum
University of Pennsylvania
33rd and Spruce Streets
Philadelphia, Penn. 19174
U.S.A.

Dear Miss Ralph:

You may or may not be familiar with the American Research Institute in Turkey (ARIT), for in the past its operations have been humble. In the last three or four years, however, ARIT has started to make its presence felt. The aims of ARIT are basically to maintain a high degree of excellence of scholarship dealing with the ancient and modern Near East. Archaeology has been the main concern of ARIT Ankara, whereas our other branch in Istanbul deals mainly with with more recent Turkish history and literature.

Over the past three years our research library has grown from a mere 350 volumes to over 3,000 plus periodicals. This growth is largely due to the enthusiasm and generosity of our supporters. The University of Pennsylvania, Bryn Mawr College, the American Institute of Archaeology and many individuals have gone out of their way to see to it that ARIT grows in spite of financial pinches. Our library budget is small, and therefore we make many requests for personal donations. It is only in this way that that we can keep up with recent research. We do feel that we are a representative of American scholarship, but alas we cannot buy publications at will. Would you find it within your means to offer to our library a copy of your recent book, Dating Techniques for the Archaeologist? In fact, we would be interested in having any publications or offprints which you feel might be of use to us.

What is more important than a donation is your interest in our work here. Fostering higher quality research in Turkey is a role which we are adopting. I hope that you will one day soon be able to visit our institute. Thanking you in advance for your consideration of the above,

Sincerely yours,

Prentiss S. de Jesus
Prentiss S. de Jesus
Director

THE AMERICAN RESEARCH INSTITUTE IN TURKEY
TÜRK - AMERİKAN İLMİ ARAŞTIRMALAR DERNEĞİ

71/5 KENNEDY CADDESİ
KAVAKLIDERE, ANKARA
TEL : 17 45 84

May 21, 1973

Mr. Henry N. Michael
University Museum
University of Pennsylvania
33rd and Spruce Streets
Philadelphia, Penn. 19174
U.S.A.

Dear Mr. Michael,

I have just received your and Miss Ralph's book, Dating Techniques for the Archaeologist, for which I would like to sincerely thank you. The rapidity with which you answered my request was indeed thoughtful on your part.

Due to gifts such as yours ARIT has been able to grow and become a significant organ of research in Turkey. We have had four year-round researchers working here this year, which shows that we can offer adequate facilities for archaeologists as well as those in specialized fields, such as political science and sociology.

It would be indeed a pleasure for me to one day meet you. Until that time, I remain

Sincerely yours,



Prentiss S. de Jesus
Director

THE AMERICAN RESEARCH INSTITUTE IN TURKEY
TÜRK - AMERİKAN İLMİ ARAŞTIRMALAR DERNEĞİ

71/5 KENNEDY CADDESİ
KAVAKLIDERE, ANKARA
TEL : 17 45 84

May 21, 1973

Elizabeth K. Ralph
University Museum
University of Pennsylvania
33rd and Spruce Streets
Philadelphia, Penn. 19174
U.S.A.

Dear Miss Ralph,

Your and Mr. Michael's book, Dating Techniques for the Archaeologist, has just arrived in the mail. It is indeed generous and thoughtful of you both to send me this book so promptly. Even though it was addressed to me I shall put it into the ARIT library as your contribution.

I write many letters asking for similar gifts, and in more cases than not, it is a fruitless task. Your gesture is an encouraging reminder that its worth bashing on and that there are people who are interested in helping ARIT grow.

I sincerely hope that one day you may personally visit our institute.

With many thanks for your gift, I remain

Sincerely yours,



Prentiss S. de Jesus
Director



AMERICAN RESEARCH INSTITUTE IN TURKEY

71 - 7 KENNEDY CADDESİ
KAVAKLIDERE - ANKARA
TEL : 17 45 84

TURKEY

July 29, 1974

Miss E.K. Ralph, Associate Director
Applied Science Center for Archaeology
33rd and Spruce Streets
Philadelphia, Pennsylvania 19174

Dear Elizabeth,

As you may know I am engaged in research in prehistoric metallurgy in Anatolia. We had our first season of field work last summer, and we are now about to start another. With the experience of last year behind us, we now understand what the problems are, and what we must do to resolve them.

Most of the sites that we visit are slag dumps. We are trying to find as many of these as possible so that we can get an understanding of how many there are in the areas under study. We hope too, eventually, to find remains of tin smelting somewhere on the fringes of the Central Anatolian Plateau. We do not think that this is a pipe dream. But getting back to our field problems, the sites that we have visited so far leave little evidence of date, as we find no sherds and no traces of habitation. From time to time we are able to dig up enough carbonized wood for C-14 analysis, but we would like an alternative dating method as a check. I had been told that it was possible to date slags, but no one that I know of at the moment has taken a concerted interest in it.

T.L.
Now, here is my proposition. If I could get sent to you a series of slags would your lab be able to embark on a program of analysis? We are hoping that the survey will eventually cover all of Turkey, since it is costing very little in the way of man power and money. MTA (Turkish Mineral Exploration Institute) is the sponsor and have been a great help in getting last year's slags analyzed in their lab (spectro-graphic).

The problem on this side, of course, is to get the material sent out of the country. I get along with the director of MTA fairly well at the moment, and that is why I think that the time is ripe to propose a program of thermo-luminescent dating of these slags. The closer we can get to the EBA slags the closer we will come to the ancient tin deposit. At least, this is the lines along which our program has been designed.

I may be able to send you some slags whose contents and date have been determined, if they can be of any use in setting up your equipment.

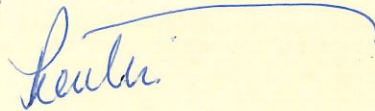
Let me know what you think of this proposal. Please be frank if you don't think that you can handle it. Incidentally, I will not be able to furnish you with anything but the samples. I have absolutely no support for this project after this month. I will, however, continue to come to Turkey every summer and pursue this question for as long as MTA will allow me.

Other matters around ARIT at this point hover around the water shortage, the garbage strike and of course the Cypriot problem. I guess that ARIT will not be sending any more researchers there this year. I myself had planned to go, but that will have to wait for a year or so. I have heard of no archaeological casualties, have you?

Have you seen Peter Kuniholm? He is in the States at this moment. He plans to come back to his desk, which I have been keeping warm for him, August 1st.

So much for now. Hope all is well with you.

Sincerely,



Prentiss S. de Jesus

P.S. I have not yet seen Madden and Muhly. I hope they turn up before I leave (Sept 1st).

AMER. SCHOOL OF ARCH.

Arch. Techniques

July 22, 1966

7
RCP

Dear Dr. Robinson:

This is just a note to say that Mrs. Katharine Webb will be in Athens sometime in August to see archaeological sites, and I suggested that she call on you to get some information about who is working where. Certainly, I would not normally bother you with a thing like this, but Mrs. Webb is interested in financing archaeological research in the Mediterranean and the Near East and hence is someone we should all encourage. At the moment she is making a contribution to one of our projects in Egypt, but she is also much interested in the Greek field. Moreover, she is a very pleasant and congenial person, and I am sure will be no trial to you.

You may have heard that we sent Beth Ralph with our new cesium magnetometer out to investigate the site of Helice with Professor Marinatos. The experiment was a complete failure because of all the metal on the site which practically gave the instrument a nervous breakdown. However, Professor Edgerton from M. I. T. will be back there in the fall with his "boomer" apparatus for undersea research. Moreover, Marinatos was not disturbed with the failure of our instrument, and when I saw him later in Rome, he had many other ideas about sites to experiment with. Also, as you may know, Beth Ralph will be back in the Peloponnesus with Mike Jameson in July and with Professor Platon at Kato Zakro in September. So, our experiments will continue in Greece.

We have had a very elaborate experiment with a new aerial camera at Sybaris, the results of which will not be known until sometime in September or October. If this really works as we hope, we may

be able to get it back to help Mike's operation next year.

All the very best,

Sincerely,

Froelich Rainey
Director

Professor Henry Robinson
Director
American School of Archaeology
Athens, Greece

FGR/vg

August 20, 1953

Chief Engineer
American Radiator and Standard Sanitary Co.
Baltimore, Maryland

Dear Sir:

I have a small laboratory in the Museum of the University of Pennsylvania in which I am trying to determine the age of archaeological objects by the natural radiocarbon method. In this laboratory I have 24 x 20 inch porcelain-coated sink, labelled number P7710, 2/2/51, Baltimore, which was made by your company.

I have discovered recently that the sink is slightly contaminated by some radioactive substance. It is a very weak and harmless contamination, but since I am working with a very low level activity, it may be causing me some trouble. The natural C 14 is much less than the normal atmospheric radioactivity so that I have to be extremely careful about cleanliness.

The contamination in the sink seems to be in the porcelain. I cannot detect it on the underside or in the drain pipe. It is possible that it came from the air or water, but other sinks in this building are not contaminated. It is also possible that something might have been thrown into the sink, but the contamination is in the porcelain of the upper part as well as in the bottom.

I am wondering if you know of anything that might have happened in its manufacture that would cause this. If you could tell me what chemicals are used in your porcelain and glaze, that information might help solve this riddle.

I imagine that this is a rather unusual problem. It is such a weak contamination that I have been unable to determine *what* radioactive element it is, and I will appreciate any information that you can give me.

Very truly yours,

Elizabeth K. Ralph

EKR:js

✓ AMERICAN SCHOOL OF CLASSICAL STUDIES
54 SOUIDIAS STREET, ATHENS, 140
CABLES: AMSCHOOL ATHENS



ΑΜΕΡΙΚΑΝΙΚΗ ΣΧΟΛΗ ΚΛΑΣΙΚΩΝ ΣΠΟΥΔΩΝ
ΟΔΟΣ ΣΟΥΗΔΙΑΣ 54, ΑΘΗΝΑΙ, 140
ΤΗΛ. 710-971

August 11, 1966

*file
for*

Dr. Froelich Rainey
The University Museum
Thirty-third and Spruce Streets
Philadelphia, Pa. 19104

Dear Dr. Rainey:

Thank you for your letter of July 22nd regarding the impending visit of Mrs. Katharine Webb. We shall be glad to welcome her here.

I had not known of Miss Ralph's visit to Greece this spring. I am sorry to learn that her work at Helike was not productive of useful results. I had planned to visit Porto Cheli this week - where I would doubtless have learned of her work there; but Mike Jameson has left and the excavation is being closed down this week, so I have cancelled my trip. I hope to hear from Charles Williams this week-end about his results at Cheli.

We have had John Huston, with Dr. Edgerton, Dr. Greenewalt and Dr. Hall, all actively searching the harbor floor at Kenchreai over the past week. Edgerton and one of his assistants will join a scientist from the Woods Hole Oceanographic Institution at Thera later this month in an attempt to obtain geological information which may also be of interest in the interpretation of the geologic changes on the island in the late 15th century B.C. We shall probably send a representative of the School with them.

Sincerely yours,

Henry S. Robinson

Henry S. Robinson
Director. E.V.

HSR/jb

AMERICAN SMELTING AND REFINING Co.

ASCA

October 8, 1963

Dear Mr. Smart:

After all these years, I hope you will remember who I am. At one time we arranged for you to do some research for Professor Case, at Oxford and I met you at some lecture in New Jersey, a few years ago.

It has occurred to me that we may interest the American Smelting and Refining Company in our study of the origins and fabrication of ancient metals. In recent years we have established here, the Applied Science Center for Archaeology, and we have begun to do some interesting work in the identification of the composition and structure particularly of non ferrous metals discovered at ancient sites in Iran, Turkey, Egypt and South America.

There are really two reasons why we have gotten into the study of these ancient metals. First, because we are working in an area where we think the production of metals was first discovered, and second, because Robert Maddin here, Director of the Department of Metallurgy, at the University of Pennsylvania, is also interested in this kind of research.

The Applied Science Center for Archaeology (A. S. C. A.) is also working on new electronic techniques for underground exploration, which is in part supported by the National Science Foundation and by electronic companies such as Texas Instruments.

I wonder if it would be possible to interest the American Smelting and Refining Company in similar financial support of our ancient metal study. Our laboratories are here in the Museum, but, of course, we work also

with Dr. Maddin's Metallurgical Department. We are now trying to expend this branch of the research and I have been looking for some outside financial support. I might add, that our work so far with the industrial firms has been most successful, and has meant some very good world-wide publicity for them.

If this interests you at all, I would enjoy showing you what we are doing and what we hope to do.

Very best wishes,

Froelich Rainey
Director

Mr. Stewart Snart
Assistant to the Vice-President
for Research
American Smelting and Refining Company
Bayonne, New Jersey



AMERICAN - Standard

AMERICAN RADIATOR & STANDARD SANITARY CORPORATION

RESEARCH
PLUMBING DIVISION

File E-1A

September 3, 1953

834 E. BROADWAY
LOUISVILLE 4, KY.

Miss Elizabeth K. Ralph
Randal Morgan Laboratory of Physics
University of Pennsylvania
Philadelphia 4, Pennsylvania

Dear Miss Ralph:

Your letter of August 20 addressed to our Baltimore Plant has been referred to our Research Department.

We have checked the raw materials which go into the manufacture of the enamel used on our sinks and find no reported traces of radioactivity in these materials. The component materials when smelted into an enamel actually form a glass and, as such, the various oxides in the glass can be contaminated by radioactive materials. We can only conclude, therefore, that this is what must have happened in the case of your sink, and it is likely that the enamel would retain such contamination more readily than would the base iron.

Since all porcelain enamels are very similar in elemental composition, we suggest that the best way to avoid such a contamination in the future is to make absolutely certain that radioactive materials are not placed in contact with the enamel surface of the sink.

We trust that this information will be of some help to you.

Yours very truly,

J. S. Goodman
Chief Engineer
Chemical Department

JSG: jkb

UNIVERSITY OF MIAMI
CORAL GABLES, FLORIDA 33124

DEPARTMENT OF GEOLOGY
P. O. BOX 8001

Feb. 6, 1974

Dr. Elizabeth Ralph
Radiocarbon Laboratory
University Museum
33rd and Spruce Sts.
Phila. Penna. 19174

Dear Dr. Ralph:

I regret that I was unable to revisit your laboratory after Christmas, but last minute developments forced me to return to Miami prior to New Year's. Thus I was unable to stop at the Museum Store to pick up copies of your book that you so graciously had put aside for me. Is there any way that I can order two copies for the Laboratory down here? I would be grateful for assistance concerning this.

After consulting with Dr. Stipp a few weeks ago, he suggested you concerning some reprints. I was wondering as to whether you might know of any literature concerning problems involved with dating material from shipwrecks. At present we have had an occasion outside request regarding the feasibility of dating material from assorted wrecks off the Florida Coast. However, with the recent purchase of oil lease sites in the Gulf of Mexico, and the strict Federal Law now in effect regarding underwater historical sites, we may have an increase in these requests. Thus I would be greatly appreciative of any help from you in reference to this.

I hope that everything is going well with your lab, especially your Benzene rig. If I can be of any assistance regarding your Benzene setup, I would be more than glad to help.

Thanking you in advance for your help I am

Sincerely yours,

Mike Andrejko
Mike Andrejko

February 18, 1974

Mr. Mike Andrejko
Department of Geology, P.O. Box 8001
University of Miami
Coral Gables, Florida 33124

Dear Mr. Andrejko:

About our book (Michael and Ralph, Dating Techniques for the Archaeologist, MIT Press 1971), I had bought two copies for you at a discount, but have since given them away. You should be able to order copies from your University bookstore, but if not, you could order them direct from the Sales Department, University Museum. Quite frankly, I do not want to bother with them again.

About shipwrecks, I have enclosed three reprints in which ^{C14} dates are reported. In processing them, we have not had any special problems except that they are harder to purify than samples from dry land. They seem to contain a sulphur compound which causes a foul odor in the laboratory.

Sincerely yours,

Elizabeth K. Ralph

EKR/dh

Encl.

c/o Department of Anthropology
McGraw Hall
Cornell University
Ithaca, New York 14853
August 26, 1980

Ms. Elizabeth Ralph
Department of Physics
University of Pennsylvania
Philadelphia, Pennsylvania 19174

Dear Ms. Ralph,

I recently concluded archaeological excavations at Azángaro, a Wari administrative site in the Departamento de Ayacucho, Peru. My concerns were the clarification of the growth and nature of administrative institutions in this early Andean state.

To date, Wari has been accepted as spanning a period between A.D. 500 and A.D. 1000. The identification of pottery types at Azángaro would place the occupation of the site between A.D. 700 and A.D. 800. However, other specific archaeological information as well as my own hypotheses as to the appearance and abandonment of such sites and the decline of the state would suggest that the site's occupation is later in time. I am anxious to dispel, if possible, the ambiguity created by previously accepted ceramic typologies as they relate to relative dating of the Wari state and the data retrieved from Azángaro.

I have a number of burnt wood and burnt corn cob samples taken from secure proveniences at Azángaro which I exported from Peru earlier this year. I would like to have assays run on a few. Would you be good enough to tell me if the Physics Laboratory at the University of Pennsylvania would run these samples. If so, at what price would they be run? (If at all possible, I would appreciate any consideration made in the rate since I would be paying from personal funds. My Fulbright-Hays and Social Science Research Council dissertation grants could not be stretched to cover such tests after considerably heavy labour and equipment costs in the field.)

Thank you very much for your attention. I look forward to hearing from you.

Sincerely,

Martha B. Anders

Martha B. Anders

UNIVERSITY of PENNSYLVANIA

PHILADELPHIA 19104

The Faculty of Arts and Sciences

DEPARTMENT OF PHYSICS

August 28, 1980

Ms. Martha B. Anders
c/o Department of Anthropology
McGraw Hall, Cornell University
Ithaca, New York 14853

Dear Ms. Anders:

Your samples from the Wari site sound interesting, but unfortunately we have a two-year backlog of samples waiting to be dated by ^{14}C .

If you can find sufficient funds, I suggest that you send them to one of the commercial labs listed below.

- 1) Beta Analytic Inc.
Radiocarbon Dating, P.O. Box 248113
Coral Gables, FL 33124
c/o Dr. Jerry Stipp

- 2) Isotopes, Inc.
Westwood Laboratories
50 Van Buren Ave.
Westwood, NJ 07675
c/o Mr. Jim Buckley

Beta charges \$175 per sample and Isotopes, \$200.

I understand that Beta does not have a large backlog.

I have enclosed a list of the items of information that are required by all labs.

Sincerely yours,

Elizabeth K. Ralph

EKR:bac

Enclosure

Arctic - Anderson

c/o MOSUL MUSEUM
MOSUL, NORTHERN IRAQ
IRAQ
6-III-64

Dear Beth,

There is a very good young Iraq archaeologist out here conducting a dig near Samarra and he has produced Archaic Harappa material - that is to say earlier than 5000 Bc. It is quite exciting because the town seems to have been fortified and may provide a challenge for Jericho.

He desperately wants a C-14 date for his stuff & I said Univ. of Penn. would be delighted - scratched it out of other hands, so to speak. If you are terribly overloaded, could I bring it back around the first of June & if it didn't fit into your schedule we could loan it out?

As you can imagine the date is of great importance & our Museum would receive a certain amount of status from running the samples. The archaeologist is very pleased with possibility of our lab taking an interest in it. Much good will can so be gained.

Can you let me know how long he would have to wait for the result if I brought it back to USA June 1st - either to you or someone else? If you haven't time to answer give the info to D. Crowder & he can let me know.

Best to you,
T.A.

ANDERSON

FRANDON BARRINGER
CHARTERED FINANCIAL ANALYST
2106 GIRARD TRUST BUILDING
PHILADELPHIA, PA. 19102
(215) 561-3676

July 1, 1970

✓ Dr. Glyn Daniel, Editor
ANTIQUITY
c/o W. Heffer & Sons, Ltd.
104 Hills Road
Cambridge, C B 2, 1 LW
England

Dear Sir:

Congratulations on the 50th issue of ANTIQUITY under your editorship. You have certainly maintained the high standard set by its founder and kept it the most prestigious of all the archaeological publications. I see most of them and have been a "cover to cover" reader of yours for twenty years.

I am also writing in connection with the Radiocarbon Dating articles in your March and June issues. Expressing these dates as "B.P." has always been clumsy, as accuracy requires adding what "present" one is referring to and we have already had 20 years of "presents". Now we begin to see two dates given simultaneously representing different estimates of carbon 14 half life and, apparently, will have a third based on the newest half life!

More importantly, the dendrochronological records show the need of very important further corrections. Could not some center such as the Applied Science Center for Archaeology of the University Museum of the University of Pennsylvania (MASCA) or La Jolla periodically publish all corrections agreed on by the authorities up to that time? Dates in the future could then be shown not only as B.P. on whatever half life is being used but also A.D. or B.C. after deducting the year of determination and adjusting for the, say, MASCA correlation. Thus, instead of 4000 ± 200 B.P. (Half Life 5560) (A.D. 1970), we would have the far more meaningful and standardized 4000 ± 200 B.P. (MASCA correlated 2500 ± 200 B.C.)

Can you suggest the best way in which this could be accomplished?

Sincerely,

BB:mcb

Brandon Barringer

bcc: Dr. Froelich G. Rainey ✓
Miss Elizabeth Ralph

ARCAFA
PROJECT, KHMER
REPUBLIC

August 6, 1974

Dear Mr. Um Samuth:

I have your letter of July 19th regarding ARCAFA and I am grateful for the publications which I had gotten through Lisa Lyons in Bangkok. Since we have been very much involved in new scientific techniques in our Applied Science Center here for many years and since we are already working in Thailand at Ban Chiang, we would of course be more than happy to assist you in any way in setting up and operating ARCAFA. I can't be too optimistic about helping you with funds since, of course, we have to raise the money each year to run our Applied Science Center and we do not find this too easy. However, I will be glad to recommend your center to foundations to whom you apply here or to UNESCO or whatever.

All best wishes for a successful project.

Most sincerely yours,

Froelich Rainey
Director

Mr. Um Samuth
Project Coordinator
Khmer Republic
ARCAFA Project Development Office (APDO)
2 Samdech Ouk
Phnom Penh, KHMER REPUBLIC



KHMER REPUBLIC

ARCAFA PROJECT DEVELOPMENT OFFICE (APDO)
2 Samdech Ouk, Phnom-Penh, KHMER REPUBLIC

TELEPHONE: 2-4118, 2-2572
CABLE ARCAFA PHNOM PENH

Ref: 133 APDO/74

July 19, 1974

Prof. Froelich Rainey
The University Museum
University of Pennsylvania
Thirty-Third and Spruce Streets
Philadelphia PA. 19174

Dear Prof. Rainey :

I was informed of your interest in the Applied Research Center in Archaeology and Fine Arts (ARCAFA). I trust that the publications you had on ARCAFA will help you understand more on the objectives of this newest SEAMEO Center which deals with the problems of archaeology and fine arts in the region.

Though still in its formative stage, ARCAFA has already done an in-depth survey of the existing archaeological resources of the SEAMEO region in terms of manpower, facilities and equipment and its expected future needs. This, together with the scientific seminars held in various member countries and the host country of the Center, will enable ARCAFA to draw up a development plan geared to the problems and needs of the region in the field of archaeology and fine arts.

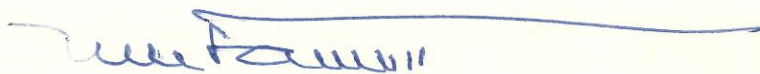
The scientific seminars did provide an opportunity for a meeting between archaeologists and fine art specialists in the SEAMEO region as well as scholars from outside the region to find ways and means of solving common problems and to establish priorities for regional action programs. This is the first experience unprecedented in the region and ARCAFA is very honored to play host to such an undertaking.

As it is projected in the Guidelines for the Establishment of the ARCAFA Project Development Office, a development plan for ARCAFA is now drawing up by the office to be reviewed by a coordinating committee consisting of one representative from each member country. The Development plan will be presented to the Southeast Asian Ministers of Education Council (SEAMEC) at its tenth conference in early 1975 for consideration and approval after which the interim ARCAFA will then begin, to be followed at the appropriate time by the permanent operation, according to the practice of SEAMEO in establishing regional centers/projects. We hope to begin courses for trainees in June 1975 based on the facilities already at our disposal.

However, like all SEAMEO Centers, ARCAFA will need help and assistance from outside organizations and institutions and it is in this spirit that we would like to make the Center known to as large an audience as possible. The University Museum of the University of Pennsylvania of which you are its eminent director will undoubtedly be in the position to help up in this endeavor by suggesting names of foundations and organizations which are willing to provide help and assistance to the Center.

Your contribution toward this goal will be greatly appreciated.

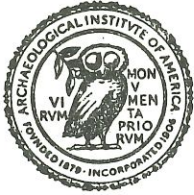
Sincerely, *HS*



Um Samuth
Project Coordinator

HS/kh.

cc: - Ministry of Culture
- Mr. Harry J. Petrequin
RED, Bangkok
THAILAND



ARCHAEOLOGICAL INSTITUTE OF AMERICA

260 WEST BROADWAY
NEW YORK, N. Y. 10013

TELEPHONE: 212/925-7170

December 12, 1972

Miss Beth Ralph
Applied Science Center for Archaeology
University Museum
33rd and Spruce Sts.
Philadelphia, Pa. 19104

Dear Beth:

I am in the process of revising our Fieldwork Opportunities Bulletin, and I notice that in the last one it was mentioned that the ASCA "acts as clearing house for information on experiments and new techniques in archaeological research, some of which the ASCA itself conducts." Is this accurate, and may we again include this in our bulletin? Are there any other services or publications or programs available through ASCA which might be of interest to our members and which I might mention in this bulletin? Any cost? It would seem that we ought to clarify what is meant by acting as a clearing house, if in fact you do this. Would you be good enough to advise me what I ought to include in this year's publication.

I'm looking forward to seeing you at the Annual Meeting. Our visits are too few and far between! Hope you have a Merry Christmas (Haven't even bought any cards yet, so don't know if you'll be getting one this year).

Best,

Elizabeth A. Whitehead

Our new home address and phone:

66 Vista Drive
Greenwich, Conn. 06830

(203) 661 7111

December 20, 1972

Mrs. E. A. Whitehead
Archaeological Institute of America
260 West Broadway
New York, N.Y. 10013

Dear Betsy,

As part of our MASCA (we changed the name from ASCA) program, we attempt to answer inquiries about the various techniques derived mostly from the physical sciences that are applicable to archaeological research. The particular ones that we pursue actively are as follows:

- 1) Carbon - 14 dating
- 2) Thermoluminescent dating of pottery
- 3) Development and use of instruments such as magnetometers for archaeological prospecting
- 4) Aerial photography and other remote sensing devices
- 5) Information center with card files and references, and publication of the MASCA Newsletter which is now free of charge (copy enclosed).

In regard to the Information Center, we do not have time to do a complete research job to answer some inquiries, but any qualified person is welcomed to come here to use the files.

Also, we do not accept most volunteers, nor do we have salary funds for outsiders to participate in our work in the field.

I hope that this answers your questions, and I am looking forward to seeing you at the Annual Meeting.

Merry Christmas,


Elizabeth K. Ralph

ER/sa

Enclosure 1

*File
pub
FGR*

August 3, 1972

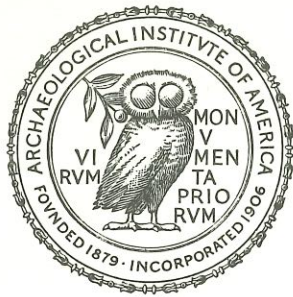
Dear Mrs. Katz:

I see by your letter of July 27 that Beth Ralph has practically committed me to do an article on the Application of Scientific Techniques so I suppose I should do this. I will try and get something out in the next couple of months.

All best wishes,

Froelich Rainey
Director

Mrs. Phyllis P. Katz
Editor
ARCHAEOLOGY ✓
260 West Broadway
New York, New York 10013



ARCHAEOLOGY

260 WEST BROADWAY, NEW YORK, N.Y. 10013 U.S.A.

PHONE: (212) 925-7170 / 925-7138

27 July, 1972

Dr. Froelich Rainey
Director
University Museum
33rd and Spruce Streets
Philadelphia, Pennsylvania 19104

Dear Dr. Rainey:

Here is the letter I promised to write you when I met you last Tuesday. Beth Ralph, who is now a member of our Editorial Advisory Board, suggested I ask you to write a composite article for us reporting on the latest scientific discoveries applicable to archaeology.

We would be interested in substantive results -- successful applications of scientific tests to archaeology, not tests trying to establish such procedures. Beth said she would be happy to "feed" you the information.

Our articles usually run about 2,500 words with approximately ten (10) illustrations. You can use this merely as a guide and write whatever you feel is appropriate.

Our coverage of the application of science to archaeology has not been good, and we would be pleased if you could help us fill this gap. There is, of course, no specific deadline. We will publish the material as soon as it is received.

Thank you for your courtesy and cooperation in this matter.

Best wishes.

Very truly yours,

Phyllis Katz

(Mrs.) Phyllis P. Katz
Editor

PPK/grl

January 29, 1977

Dr. Phyllis Pollak Katz
Editor
Archaeology Magazine
260 West Broadway
New York, New York 10013

Dear Dr. Katz:

In the January 1977 (Vol. 30, No. 1) issue of Archaeology, I happened to read about the "New Society Formed" (page 58) - namely, the American Society for Conservation Archaeology, and I noticed the abbreviation "ASCA".

I suspect that they are not aware that "ASCA" was copyrighted by Automatic Subject Citation Alert (ASCA) of the Institute for Scientific Information (ISI), 325 Chestnut Street, Philadelphia, Penna. 19106.

Because of this, we had to change from "ASCA" to "MASCA".

I think that it might be advisable for Archaeology to inform the new "ASCA", and to publish a correction.

Sincerely yours,

Elizabeth K. Ralph



ARGONNE NATIONAL LABORATORY

August 20, 1968

Mr. Raymond Ring
Applied Science Center for Archaeology
The University Museum
University of Pennsylvania
33rd & Spruce Streets
Philadelphia 4, Pennsylvania

Dear Mr. Ring:

Your inquiry of August 5 was passed on to me. I am enclosing a paper which resulted from our work on thermoluminescence in bone. As you will see, living bone is very unreliable in this aspect of thermoluminescence. However, there is an indication that calcium phosphate and biogenic calcium carbonate, as well as bone-like materials, do exhibit thermoluminescence and have well-developed traps. Thus, I would certainly pursue the experiments for archaeological information.

I look forward to hearing from you on your results in this area.

Yours sincerely,

Jacob Kastner
Associate Physicist
Radiological Physics Division

JK:frc
Encl: (1)
cc: files

*Paper filed in ASCA
RR*

The Arizona Daily Star

STAR PUBLISHING CO.
P.O. BOX 5058 208 N. STONE AVE.
TUCSON, ARIZONA

17 December 1962

Dr. Elizabeth K. Ralph
Applied Science Center for Archaeology
The University Museum
Philadelphia 4, Pa.

Dear Dr. Ralph:

Thank you very much for the abstract of your AAAS paper, and, yes, I would indeed appreciate a copy of the complete paper when available.

I'll be staying at the Sheraton, checking in at noon on the 26th.

Again, thanks.

Sincerely,

Carle Hodge

Carle Hodge
Science Editor

Bellevue

PE 5-0700

The Arizona Daily Star

STAR PUBLISHING CO.
P.O. BOX 5058 208 N. STONE AVE.
TUCSON, ARIZONA

8 December 1962

Dr. Elizabeth K. Ralph
Applied Science Center for Archaeology
University Museum
Philadelphia 4, Pa.

Dear Dr. Ralph:

Since Arizonans apparently have a special interest in dating the past, this newspaper hopes to report as thoroughly as is possible the 29 December symposium on Dating Man and the Pleistocene.

Therefore it would be extremely helpful if you can send me in advance of the AAAS meeting a copy of the paper you will give. It would prepare me for what I am to hear -- and cover -- in Philadelphia.

The copy will be returned to you if you so desire.

Thank you very much.

Sincerely,

Carle Hodge
Carle Hodge
Science Editor

July 20, 1973

Dr. Dieter Arnold
Egyptian Department
The Metropolitan Museum of Art
New York, New York

Dear Dr. Arnold:

July 27th will be O.K. for your visit. I have a short meeting at 11:45 A.M., but no other complications.

Sincerely yours,

Elizabeth K. Ralph

Elizabeth K. Ralph

EKR/11

Dr. Dieter Arnold c/o
Egyptian Department

The Metropolitan Museum of Art

17/7/73

Dear Dr. Ralph,

I would like to come to Philadelphia to see some of my colleagues and would also like to meet you in order to discuss some questions connected with your work in Egypt. Would July 27th be convenient for you? Otherwise I would ask you to send me a note to the MMA. I could also come a few days later.

Yours sincerely

Dieter Arnold

ASCA

December 18, 1963

Dear Dr. Ascher:

Sorry we have nothing more published on the Applied Science Center, except for my small announcement for the journals, which is attached.

Also, sorry about Merrillees, but we might get him here. I will look him up in London this winter.

Regards,

Froelich Rainey
Director

Dr. Robert Ascher
Associate Professor
Department of Anthropology
Cornell University
Ithaca, New York

CORNELL UNIVERSITY

ITHACA, NEW YORK

DEPARTMENT OF ANTHROPOLOGY

MORRILL HALL

December 9, 1963

Dr. Froelich Rainey, Director
The University Museum
University of Pennsylvania
33rd and Spruce Streets
Philadelphia 4, Pennsylvania


Dear Dr. Rainey:

Thank you very much for suggesting Robert S. Merrillees as a possible candidate for our opening in archeology. After much discussion, it appears clear that no matter how much we might like to, we are not in a position to consider someone currently in Europe. The reason is simple; we do not have sufficient funds to bring him here and we would not want to seriously consider someone without being able to talk with him at length.

I have read some notices, in American Antiquity and elsewhere, about the Applied Science Center for Archaeology. If you have a more specific description of the Center, or even something as general as the notice in Antiquity, I would be anxious to have a copy.

Again, thank you for your thoughts and suggestions with regard to our anticipated appointment.

Sincerely,


✓ Robert Ascher
Associate Professor of Anthropology

RA:jo

CORNELL UNIVERSITY

ITHACA, N. Y. 14850

DEPARTMENT OF ANTHROPOLOGY

McGraw Hall

October 6, 1965

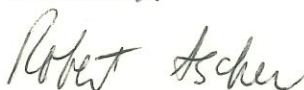
Dr. Froelich Rainey
University Museum
University of Pennsylvania
Philadelphia, Pennsylvania

Dear Dr. Rainey:

Our Department currently has available a sum of money to purchase equipment for use in a modern archaeological laboratory. Given the existence of the Applied Science Center and the Museum, we thought that it would be of value to us to visit the Center and Museum to learn about equipment that you now use or are developing. Do you think such a visit is advisable? If you think it is, could you tell us what days of the week would be best? Since we would drive and want to avoid possible bad weather, we would prefer to travel sometime between now and Thanksgiving.

We would greatly appreciate your advice on this matter.

Sincerely,



Robert Ascher
Associate Professor of Anthropology
and Archaeology

RA/j

Technique

October 16, 1965

Dear Dr. Ascher:

Sorry for the delay in replying to yours of October 6th, but I have just again returned from Italy. We would be happy to have you here to look at our Applied Science Center and discuss equipment for archaeology. Our physicist, Beth Ralph, is still in Italy, but I will be here and would enjoy talking to you about it.

The Museum is closed on Mondays, but we are here on Saturday mornings and all the rest of the week from 10 to 5. For me the best days are Tuesdays and Thursdays or Saturday mornings, since I have classes on Wednesdays and Fridays. Just let me know when you will be along.

Very best wishes,

Froelich Rainey
Director

Dr. Robert Ascher
Department of Anthropology
Cornell University
Ithaca, New York 14850

FGR/vg

CORNELL UNIVERSITY

ITHACA, N. Y. 14850

DEPARTMENT OF ANTHROPOLOGY

McGraw Hall

October 22, 1965

Dr. Froelich Rainey, Director
The University Museum
University of Pennsylvania
33rd and Spruce Streets
Philadelphia, Pennsylvania 19104

Dear Dr. Rainey:

We appreciate your response to our recent letter requesting a visit to the Applied Science Center. I say we, because a new faculty archaeologist here, Tom Lynch, is also interested in making the trip. We will probably come together.

The best date for us is Thursday, November 11. Although this is Veteran's Day, we assume that this would cause no difficulty. An alternative is Tuesday, November 23. I am sure that we can find our way to the Museum at about 10:00 A.M. on either day. If some other Tuesday or Thursday is better for you, please let us know.

We are looking forward to meeting you.

Sincerely,



Robert Ascher

RA/j

Techniques

October 28, 1965

Dear Dr. Ascher:

I just have yours of October 22nd, and urge that you plan on coming down on Tuesday, November 23rd, because on Thursday, November 11th, I have to give a paper at the American Philosophical Society and we also have a donors' dinner, that evening.

If this is all right, I will look forward to seeing you at 10:00 a. m. on November 23rd.

Very best wishes,

Froelich Rainey

Dr. Robert Ascher
Department of Anthropology
Cornell University
Ithaca, New York 14850

FGR/vg

February 23, 1972

Professor Robert Ascher
Department of Anthropology, McGraw Hall
Cornell University
Ithaca, New York 14850

Dear Professor Ascher:

Dr. Rainey and I were very pleased to receive your outline and bibliography for your course entitled "Science in arhhaeology". This was for Anthropology 452, Spring 1968.

I realize that we have been slow in thanking you, but we have found the bibliography to be very useful.

I am wondering if you have compiled a new one more recently and if so, may we trouble you for a copy?

Thank you in advance,

Sincerely yours,

Elizabeth K. Ralph

EKR/ek

THE UNIVERSITY MUSEUM



UNIVERSITY OF PENNSYLVANIA

THIRTY-THIRD AND SPRUCE STREETS

PHILADELPHIA, PA. 19104

CABLE ADDRESS "ANTIQUE"

TELEPHONE: EVERGREEN 6-7400

(AREA CODE 215)

October 15, 1969.

Dear Beth:

Greetings from Copenhagen!

I have a favor to ask: Has there been any recent development on the ~~dates~~ radio-carbon dating for the Early Dynastic of the Inanna temple from Nippur — several years ago, the radio-carbon dating for this was ~~been~~ unexpectedly low. Has the situation changed now, and if so, how come?

Also, what is your picture of the various crucial dates in the Near East as of to-day.

Thanks so much:

Yours
Sams Noah Kramer
(Jahresh's relative!!)

My address is:

Agyptologisk Institut
University of Copenhagen
Njelsgade 2
1155 Copenhagen K
Denmark

Mention
Bjorkman thesis

October 21, 1969

Dr. Samuel Kramer
Assyriological Institute
University of Copenhagen
Kejsergade 2
1155 Copenhagen K
Denmark

Dear Dr. Kramer:

Thank you for your greetings from Copenhagen, and greetings to you from Philadelphia!

We have now obtained enough C-14 dates for tree-ring-dated sequoias and bristlecone pines to arrive at a table of correction factors for radiocarbon dates. See Table 1 in the enclosed preprint. The application of these to some of the Egyptian dynasties is described also.

Two other laboratories (La Jolla and Arizona) have also measured long series of bristlecones and on the average, we have excellent agreement. Since the mixing rate of the atmosphere is rapid, it doesn't matter that the calibration samples came from California--the results can be applied anywhere in the world. Therefore, we believe that these correction factors should be applied to all C-14 dates. This will make all time scales, previously based upon uncorrected radiocarbon dates, somewhat longer.

We have made a chart for you of our C-14 dates from the Inanna Temple. These were corrected for the 5730 half-life and then our new correction factor was added (in accordance with the figures on Table I). The result is a much earlier series of dates for Early Dynastic I and II.

If I have made this sound confusing, I am sure that Henrik Tauber (C-14 lab, National Museum, Copenhagen) will be glad to explain it to you.

Best regards,

Elisabeth K. Ralph

EKR/arb

May 5, 1972

Prof. Pauline Atherton
School of Library Science
113 Euclid Avenue
Syracuse, New York 13210

Dear Prof. Atherton:

Dr. Rainey does not have a copy of his lecture entitled "The Application of Science in Archaeology," so I have enclosed a copy of an article published in Science.

If there are one or two subjects in which you are particularly interested, please let me know, and I shall send some more recent reprints.

Sincerely yours,

Elizabeth K. Ralph

EKR/mm
Enclosure

Atlantic Richfield Company

260 South Broad Street
Philadelphia, Pennsylvania 19101
Telephone 215 735 2345

Henderson Supplee, Jr.
Director
Former Chairman of the Board

*Original
sent to Mr. Capenda
vs 12/9
1967*

Teubergers

December 6, 1967

*John,
I have also been in the
please write the request
at City Center,
N.Y. - and
let me know the
of your*

Dear Dr. Rainey:

The enclosed memorandum is in reply to your
inquiry. If you are further interested I shall
be pleased to be helpful.

Sincerely,

Henderson Supplee

Dr. Froelich Rainey
Director, The University Museum
Thirty-third and Spruce Streets
Philadelphia, Pa. 19104

*but they say
some
old water channels
is a very good guide
to old stream beds
and also to
ponds which
may indicate down
faults, etc.
Very useful now
in sold
prospecting.
Fro*

Mr. Davis

INTERNAL CORRESPONDENCE

8

To: Mr. Julius Babisak - 830

From: R. S. Agatston

Subject: Infra-red Photography

Date: November 30, 1967

Infra-red photography brings out subtle changes in soil, rock, and vegetation colors more clearly than ordinary black and white photography. These changes are useful in mapping formations and detecting faults and fractures. Thus, they enable the geologists to accomplish a better job of structural analysis.

Infra-red surveys can be conducted at night and/or where weather conditions are generally unfavorable (haze, fog, etc.) for routine black and white or color photography.

Finally, certain systems can penetrate beneath a cover of heavy vegetation to map drainage patterns. These patterns, if sufficiently distinctive, can be related to subsurface structure.

From the standpoint of oil exploration, we are not convinced that results obtained from the infra-red approach are sufficiently superior to those from black and white photography to justify the added expenditure. Perhaps a more attractive package would be infra-red photography in combination with other aerial surveys such as magnetometer or radar.

R. S. Agatston
R. S. Agatston

hh

August 23, 1965

Mr. C. R. Atluri
Institute of Geophysics & Planetary Physics
Los Angeles, California 90024

Dear Mr. Atluri:

Thank you for your letter of August 16th, and for your reprint entitled, "Possible Anti-Matter Content of the Tunguska Meteor of 1908". I had enjoyed reading about this interesting project previously, but am glad to have a reprint. I suppose that you found it impossible to obtain a section of a tree from the region of the fall and that this is why you did this careful study with the "Hitchcock" tree.

In regard to your request for a position here, I am sorry to write that we do not now have a vacancy. We usually do at the start of the fall term, but we have been fortunate this year in finding a physicist to work with us.

If you do come to Pennsylvania, I hope that you will visit our laboratory. I expect to be here until mid-September and will return in November.

Sincerely yours,

Elizabeth K. Ralph

EKR:sn

December 18, 1969

Dear Jack:

As you see, I have looked into the possibility of doing something about Mr. Blake, and am enclosing a lot of data which explains the possibility. The only problem is that I have been having a hell of a time financing our Applied Science Center to keep it alive and now with the University awaiting appropriations from the State, we simply have no money for salaries, and I am afraid I can't even maintain our present staff in MASCA. However, why don't you talk this over with Mrs. Osgood or Mr. Blake and see if this is something he would like to do just to occupy his mind. It is apparent that he could be of real service to what we are trying to do and all the attached reprints will give him an idea of just what that is.

Incidentally, best wishes to you and Eugenia for the holiday season.

All the best,

Froelich Rainey
Director

✓ Mr. John C. Atwood, Jr.
8301 St. Martins Lane
Philadelphia, Penna. 19118

FR/j

Institute of Advanced Studies
RESEARCH SCHOOL OF PHYSICAL SCIENCES
✓ THE AUSTRALIAN NATIONAL UNIVERSITY

TELEPHONE: CANBERRA 49 5111
TELEGRAMS: NATUNIV, CANBERRA

Department of Geophysics and
Geochemistry.

BOX 4, P.O.
CANBERRA
A.C.T. 2600

PLEASE QUOTE REF.

4th June, 1969.

Dr Robert Stuckenrath Jr.,
Department of Physics and University
Museum,
University of Pennsylvania,
Philadelphia, Pennsylvania 19104.
U.S.A.

Dear Dr Stuckenrath,

We are currently using NBS Oxalic as ~~one~~ modern reference standard, with $\delta^{13}C$ values being analyzed for us by T.A. Rafter's lab. in New Zealand. Together with other workers we find that even using tightly controlled procedures of wet oxidation, we get a variation from -17 to -23% w.r.t. P.D.B. and we are considering going back to a wood standard. It would assist us if you could send some of your 125 yr. old wood standard, so that we could compare it to the wood we intend to use.

To give us a full sample 12g will suffice, but should you have more to spare, we would like to carry out several independent determinations and crosschecks.

Yours sincerely,

Henry Polach

H. Polach
Radiocarbon Laboratory

RICK

6/11/69. Barbara: Can you help him out? He's nice people, one of the few who returns a favor when the chance arises. Suggested he try letting the reaction go for five to six hours to reach completion. It works here, anyway. Bob.

June 17, 1969.

Mr. H. A. Polach
Department of Geophysics
and Geochemistry
✓ Australian National University
Box 4, P.O. Canberra A.C.T. 2600
Australia

Dear Mr. Polach:

As you no doubt know by now, Bob Stuckenrath is no longer with us, but at the Smithsonian in Washington, D.C. Because of this he has sent your letter along to me.

Under separate cover I am sending you 39 grams of our sample number P-1330.

P-1330. P-NE-HOP-1a
Quercus sp.
Ring count from bark: A.D. 1845±5

I hope that this will be satisfactory.

Sincerely,

(Mrs.) Barbara Lawn

Institute of Advanced Studies
RESEARCH SCHOOL OF PHYSICAL SCIENCES

THE AUSTRALIAN NATIONAL UNIVERSITY

TELEPHONE: CANBERRA 49 5111
TELEGRAMS: NATUNIV, CANBERRA

Department of Geophysics and
Geochemistry

BOX 4, P.O.
CANBERRA
A.C.T. 2600

PLEASE QUOTE REF.

25th June, 1969.

Mrs B. Lawn,
Radiocarbon Laboratory,
University of Pennsylvania,
Philadelphia 19104. USA

Dear Mrs Lawn,

Thank you for sending us part of your wood sample P-1330. P-NE-HOP-1a. It will be extremely useful to us as a comparison between our oxalic standard values and values of various wood standards. As soon as we obtain any results we will let you know.

Yours sincerely,

John Head

John Head
Radiocarbon Laboratory

M e m o r a n d u m

To: Dr. E. Ralph
From: F. Otto Haas
Date: March 24, 1977
Subject: Visit of Dr. Ayoub

cc: Dr. Pritchard
Mr. Crownover
Dr. Butterbaugh

Attached is a cable from Dr. Ayoub concerning his forthcoming visit. I have since received a second cable indicating that he will arrive in Philadelphia on Monday, March 28, and will be here for two nights. He will be accompanied by his son Osama.

Since the Philadelphia hotels are completely booked the week of March 28 and since Dr. Butterbaugh is away, I have cabled Dr. Ayoub suggesting that his visit be rescheduled for a mutually convenient time at a later date - possibly in May when Dr. Butterbaugh will be here.

F. O. Haas

F. Otto Haas

Attachment

M PHA057(0452)(2-0406736079)PD 03/20/77 0453

ICS IPMIIHA IISS

IISS FM ITT 20 0453

RMS PHILADELPHIA PA

AW033 VIA ITT X01239 RAB35901

UINX HL MPRA 043

RABAT RP 43 20 0600

LT

PROFESSOR OTTO HAAS

1101 PNB PLAZA BUILDING FIFTH AND MARKET STREETS

PHILADELPHIA USA PENNSYLVANIA

DELAY TICKETS CROWNOVERS LETTER ONLY ARRIVED

TODAY 19 MARCH COMING FOLLOWING WEEK FIVE DAYS

VISIT MASCA NEGOTIATIONS FOR PRESERVATIONS EXPECT

ANOTHER CABLE WEDISDAY FIXING EXACT DATE ARRIVAL

DOCTORE AYOUB

22 MRZ. 1977

COL LT 1101 19

NNN

NNNN