THE ASSOCIATION OF EXPLORATION GEOCHEMISTS

July 31st, 1971.

JULY NEWSLETTER

Since the April newsletter your Association Committees have been quite active and I am pleased to include a number of progress reports in this newsletter. These reports are due largely to the excellent response given by the general membership to questionnaires circulated early this year. I wish to take this opportunity to reiterate the thank you expressed by the various Committee Chairmen to all of you who took the time and effort to complete and return these questionnaires. As mentioned in my April newsletter, it is only through the interest and participation of the general membership that we can hope to build a viable Association.

Enclosed is a new membership list booklet with names, addresses and affiliations of all current members. For ease of reference the members have been grouped and cross-indexed on a geographical basis which gives an indication of the international scope of the organization. Hopefully the booklet will help new applicants in obtaining supporters, thus expediting their admittance into the Association. The Association continues to grow. Currently the membership stands at 276 and some thirty applications for membership have been received and are being processed for recommendation at the next Council meeting planned for September. As yet, we have no Russian members; however, Dr. Beus who is presently with the United Nations, has made application for membership. Dr. Beus is returning to his home country this fall, and hopefully that will start the ball rolling. In addition, Eion Cameron of the Geological Survey of Canada is currently on an extended tour of Russia and other parts of the world, and has taken along a number of applications.

Plans for the 1972 Symposium in London are progressing favourably and from all indications it appears that the Symposium will be well attended. The Institution of Mining and Metallurgy in London who are organizing the meeting on our behalf have received replies to the first circular indicating an attendance of nearly 300 with some 130 partaking of the field tours. Their also promises to be considerable interest in a ladies programme with approximately 100 planning to attend as of now. In answer to the A.E.G. questionnaire on charter flights, 84 replies were received, requesting a total of 124 seats. Understandably most of these were from Canada (42 replies) and the United States (35 replies). If you have not already returned your questionnaire and are interested in a charter, please indicate your interest so that we may plan accordingly. Howie McCarthy of the United States Geological Survey in Denver and

Mike Mehrtens of Rio Algom Mines, Toronto, will be organizing charters from the United States and Canada respectively; they intend to explore all possible approaches to determine the cheapest and most practical means of accommodating the greatest number of participants. D. Sampey has advised that he is investigating the possibility of charters from Australia. More definite information on charter flights will appear in the October newsletter at which time we also hope to be able to outline details on the Symposium program, field trips, etc.

The Committee reports speak for themselves; however, I would like to add a few comments. Perhaps the most satisfying development is the excellent response by the general membership to the Publications Committee questionnaire on establishing our own journal. Approximately one third of the membership replied, but more significant is the overwhelming willingness of the respondents to contribute to and participate in editing material for a proposed journal. Obviously there is a demand for a journal on exploration geochemistry and with this type of support the Association cannot help but be successful. We hope that suitable arrangements for a journal will be forthcoming by year-end.

On the subject of publications, I wish to draw your attention to the enclosed questionnaire prepared by the Case Histories and Field Practices Committee. The purpose of the questionnaire is to determine how many case histories the Association could count on for publication. I am sure many of you have been involved in surveys that would provide suitable case histories of interest to many exploration geochemists. Kindly complete and return the questionnaire at your earliest convenience; on the basis of your response, the Committee can begin making plans and compiling the first issue(s?) of our new journal.

Finally, I would like to thank the various Committees for their efforts in compiling and reporting their activities. It is particularly gratifying to note that many Committees are now made up of members from several different parts of the world.

As mentioned in the April newsletter, the purpose of the newsletter is to keep the membership informed of Association developments, and I again invite you to use this medium as a means of communication. The next newsletter deadline is October 15.

Wishing you all a pleasant and enjoyable summer -- or winter for those of you in the southern half.

John A. Hansuld.

COMMITTEE REPORTS

Analysis Committee — Chairman - H.W. Lakin

Members: H. Bloom, U.S.A
I.L. Elliott, Canada
Aslak Kvalheim, Norway
R.H. Mazzucchelli, Australia
Mike Thompson, England.

The U.S. Geological Survey has agreed to prepare about 6 standard samples of about 1,000 lbs. (450 kilograms) each. These will be carefully pulverized in Al_2O_3 ball mills (hopefully by Coors Porcelain Plant), mixed thoroughly and bottled in 4 oz. (120) gm) containers. These 4 oz. subsamples will be randomly sampled and analyzed by the U.S. Geological Survey laboratories to attempt to measure the variation of the content of each element both within and between subsamples. When these samples have been collected, prepared and evaluated statistically they will be shipped with adequate description of the samples and a list of elements of interest known to be in the samples.

It is expected that laboratories accepting standard samples will describe in adequate detail their method of analysis. The data and related methods of analysis should provide an insight into the probable best methods of analyses for each element of interest.

The standard samples will also provide means of comparison between laboratories that should prove very useful.

The Committee is grateful to those persons who have answered our questionnaire and look forward to receiving, many, many more replies. Anyone who has not received a questionnaire would render us a great service by informing H.W. Lakin who will respond with a questionnaire by return mail.

Question	Canada	United States
Total number employees in GX analyses	27 labs reporting (256 full time, 72 part time)	16 labs reporting (257 full time, 3 part time)
Membership in A.E.G.		
Members	26	23
Associate members	9	5
Affiliate members	0	3
Student members	1	3
Type of Activity:		
Mining or oil company	2	0
Exploration subsidiary of above	7	5
Government	5	2
Univ. or Tech. Inst.	4	3
Custom Laboratory*	6	3+1=4
Consultant*	6	3
Other	3	2

* Custom lab with consulting.

The Committee has sent a 7-page questionnaire to laboratories throughout the world to determine the staffing of laboratories, the type and number of samples analyzed, the general geographic source of samples, the methods of analysis identified by mode of measurement, the elements determined, and finally the willingness of the laboratory to take part in a co-operative study of standard samples.

As of July 9, 1971, we have received 63 replies to our questionnaire distributed as follows:

Canada	32	Mexico	1
United States	22	Ecuador	1
Finland	1	Guiana	1
Norway	1	Panama	1
Turkey	1	Columbia	1
Australia	1		

A brief summary of the replies of 27 Canadian laboratories and of 16 American (U.S.) laboratories is tabulated in the accompanying tables. This data shows an average production of 2,140 samples per man year. This average is biased by the dilution of research laboratories of Universities where only a fraction of the actual man year is devoted to routine analyses. To illustrate, 10 laboratories reporting 25,000 to 260,000 samples analyzed per year yield an average of 3,200 samples per man year.

Aside from elements determined only by emission spectrograph the 27 Canadian laboratories determined 60 elements and the 16 U.S. laboratories determined 62 elements. Sixty-one elements are common to both laboratories.

Essentially all reporting laboratories agreed to analyze standard samples. It is in this phase of our Committee's study that we hope to evaluate the variation of analytical data.

Number of Canadian laboratories that determine each listed element (27 labs. reporting). Underlined element is done only by emission spectrography

Element	Number of laboratories
Pb, Zn	27
Co, Cu, Ni	26
Mo	23
Ag, Mn	22
Fe	21
Hg	20
Cr, W	19
As, Cd, Mg	18
Au, Sn	16
Ca	15
Ba, Sb, U	14
Bi	13
F, K, Na, Ti	11
Sr	10
Al, V	9
S, Si	8
B	7
Be, Li, P, Se, Th	6
C, Pt, Rb, Y, Zr	5
Br, Cl, La, Nb, Pd	4
Ga, Ta	3
Ce, Cs, I, Re, Rn, Te	2
Ge, H, In, N, Rh, Sc, Tl, Yb	1

Number of U.S. laboratories that determine each listed element (16 labs reporting). Underlined element is done only by emission spectrography

Ag, Cu, Zn	16
Co, Cr, Mn, Mo	15
Ni, Pb	14
Au, Hg	13
Cd, Fe, Mg, Na, V,W, Sn	12
As, Bi, Ca, K, Sb, Si	11
Al, F	10
Ti, U, Sr, Pt	9
P	8
B, Cl, Ga, In, Th, Zr, Ba, Ta, Te, Li, Pd	7
Be, S, Se	6
Ge, Rh, Tl	5
Br, C, Ce, Er, H, Hf, Ru, Sc	3
Eu, I, Ir, La, Nb, Rb, Y	4
Cs, Gd, Ho, Sm, Os, Ra, Yb	2
Tb, Tm, Lu, N, Nd, O, Pr	1

Methods of estimation	Canada		United States	
	(Percent of total number of samples)	(Number of elements by each method)	(Percent of total number of samples)	(Number of elements by each method)
Atomic absorption	80.6	38	65	40
Emission spectrography	4.3	34	14	70
Colorimetry	14.	35	17	38
Cold extraction colorimetry	3.3	7	4	12
X-ray fluorescence spectrography	4.4	41	0.1	7
Paper chromatography	0.7	7	0.2	1
Selective ion electrode	0.5	5	1.0	9
Others	3.5	33	4	35

Question	Canada	United States
(Percent of samples in following categories)		
Soils	56.7	19.
Rocks	14.6	44.
Stream sediments	23.4	23.
Vegetation	1.9	4.3
Water	2.7	8.3
Air	0.2	0.9
Other	0.4	0.5
Total number of samples analyzed:		
(June 1, 1970 to May 31, 1971)	812,456	337,370

Case Histories — Chairman - R.L. Erickson

Members: (Provisional) — F. Canney, U.S.
H. McCarthy, U.S.
J. Walker

The Association of Exploration Geochemists is conducting a "market survey" of the membership to determine ways in which your society can best serve you. I am sure we all hope that our society will become an authoritative and reliable source of information in applied geochemistry. We also know that in order to do this, the thoughtful and wholehearted co-operation of the entire membership is required.

This brief questionnaire is addressed to the problem of publishing geochemical case histories. I would guess that there must be many completed projects in company files or projects recessed or "dead" for some reason or other that would serve to illustrate some principle of exploration geochemistry. Such case histories, successful and unsuccessful, would be of benefit to the exploration community in suggesting guidelines to follow or pitfalls to avoid. Thus - rather than appointing several committee members to ferret out case histories with which they are unfamiliar, I appeal to the membership at large to report their own experiences. To facilitate this a suggested standard format for reporting case histories is shown below.

The format was prepared to serve as a guide in the preparation of geochemical reports, and more importantly to contribute toward a better understanding of the many factors that must be or should be considered in reporting and interpreting geochemical data.

The format is designed to:

a) Act as a check list to ensure that all available pertinent information is considered and recorded.

b) present the data in a logical concise systematic manner.

c) provide some form of standardization so that different cases can be easily and systematically compared.

d) minimize the effort required to prepare a case history report.

The number and scope of the different headings will obviously depend on each individual case study. The format should be considered flexible, however the general sequence of topics should remain the same. In this regard the order of topics is designed to separate the recording of factual descriptive data from the more subjective interpretive discussion of results. The headings or sub titles used are a matter of individual style and may vary from the more conventional sentence and paragraph to a simpler, less wordy point form.

In some cases members may not wish to reveal localities or to discuss results or significance of results, but at least we would have documentation of the field and analytical practices used. Accordingly, I ask you to please answer and return the enclosed questionnaire.

If the overall response to the questionnaire is positive, each member who indicates willingness to prepare a case history will be contacted and asked to prepare same along the attached guideline and send to R.L. Erickson at the above address. These would be minimally edited, compiled, and published by the Association with by-line credit for each contributor. This would not only be a form of publication and recognition for the contributor but will be useful to the entire membership.

Suggested Format

TITLE

INTRODUCTION

- Location - optional
- Scope and purpose of the work
- Type of geochemical survey and metals involved

PHYSICAL FEATURES

- Topography
- Drainage
- Climate
- Other features where relevant (vegetation, etc.)

GEOLOGY

- Geologic setting
- Mineralization (describe type of mineralization, metal suite, alteration, ore controls, oxidation state, nature of overburden, etc.)

GEOCHEMICAL SURVEY

- Type of survey (water, stream sediment, soil, vegetation, rock, air). Describe integration with other exploration methods if applicable.
- Scope (reconnaissance, detailed, grid, sample density, special features)

- Methods
  - Field (sampling techniques)
  - Laboratory
    - Sample preparation procedure
    - Analytical method (include metal(s) tested, weight used - volumetric or actual weight, type of sample digestion, method of determination - colorimetric, atomic absorption, spectrographic, X-ray, etc.)

RESULTS

- Background, threshold, and anomalous values and how determined - statistical treatment or eyeball?
- Anomaly definition (size, intensity, and relationship to mineralization, rock type, structure, drainage, geophysics, other geochemical data).
- Significant and interesting features brought out by this particular case history. Can be done in narrative form or with geochemical map(s) or both.

REFERENCES

June 15, 1971

To: Dr. R. L. Erickson,
Case History Committee Chairman,
U. S. Geological Survey,
Federal Center,
Denver, Colorado 80225.

QUESTIONNAIRE

Name _____

Affiliation _____

1. Do you think your Society should attempt to compile, and publish case history volumes?

Yes _____ No _____

2. Would you contribute a case history(s)?

Yes _____ No _____

_____ _____

Date Signature

Computer Applications Committee — Chairman: I. Nichol

Members: J. W. Aucott (England), P. M. Bradshaw (Canada), R. G. Garrett (Canada), R. F. Horsnail (Canada), A. T. Meisch (U.S.A.), D. A. Pretorius (S.A.), A. W. Rose (U.S.A.), A. Uythoven (U.S.A.)

The following preliminary report summarizes the results of the replies received to date to the earlier circulated questionnaire.

A questionnaire was circulated to 321 members of the Association or organizations, a total of 99 were returned, and of these 7 were duplicated by two or more members responding from the same organization. Thus the respective percentage responses were 31% in terms of mailing and 29% in terms of organizations (Table 1).

The responses have been broken into 5 broad geographic groups for this initial report, i.e. Australia, Canada, Europe, Southern Africa, and the United States of America. Each of these has in turn been broken down into three sub-groups, i.e. Industry (a group containing all respondents involved in commercial activities, e.g. exploration and service companies, and consultants), University, and Government. Although the mailings and returns are known for each geographic group the returns by activity in each area are not yet known. This data will, however, be available for the final assessment.

The general review of the returns in respect of computer usage is presented in Table 2; the data for each respective geographic group is given in Tables 3 - 4. If it is assumed that all unreturned questionnaires are associated with non-users of Electronic Data-Processing (E.D.P.) and that when allowance is made for several members in the same organization, approximately 30% of the organizations polled utilize E.D.P. in some way and approximately 25% utilize E.D.P. in geochemical applications. It is thought that the former figure of 30% may well be low, but that 25% usage in geochemistry is probably realistic; this view is based on the assumption that few members who actually use E.D.P. in their work will have failed to reply, whereas more members whose organizations use E.D.P. but they themselves do not will have not replied.

The heaviest use of E.D.P. in geochemical exploration work would appear to be in the purely technological labour saving fields and in the computation of simple statistics and generation of histograms and frequency distribution curves. Some 87% of users of E.D.P. in geochemistry have some application in the analytical field, either computing working curves or computation of precision. An even higher percentage, 93%, use E.D.P. for aiding interpretation by computation of simple statistics, etc., whilst 77% use E.D.P. to assist in the generation of geochemical maps and other diagrams. This latter figure reflects very closely the availability of E.D.P. plotting equipment, from which one might conclude that the market

is not yet saturated if a comparison is made with the average 90% usage in analytical applications and simple statistics. A much lower percentage, 58%, of users are employing multivariate methods of statistical analysis, the reason for this appears to be that many consider the methods either experimental or academic.

Making a few regional comparisons, it seems that the computer revolution still has to catch on in Europe and Southern Africa where E.D.P. usage is low in industry. However, it would appear that where E.D.P. is used in these areas it is thoroughly exploited.

A brief review of the computers used reveals a great multiplicity in Europe, which is perhaps part of the reason that the idea of regional groups to share computer programs was received best in Europe. Most of the major North American computer suppliers provide support packages for plotting and scientific applications, these together with programs published by the Kansas State Geological Survey have largely filled North America and some overseas requirements in these directions.

With regard to the questions on action to be taken to promote the use of E.D.P. and statistical analysis as an interpretive aid all the suggestions in the questionnaire received support. The greatest response was to the presentation of case histories of E.D.P. usage and a careful description of the benefits of this route. The response to this question undoubtedly relates to the relatively low usage of multivariate methods of data analysis, implying that many members are waiting to be convinced of the advantages.

Finally, an additional question was circulated to Canadian members referring to the establishemnt of an index of geochemical data, the aim of the index being to make people aware of work already done and so direct interested parties towards the sources of the data. The establishment of such an index would have to be carefully carried out in order to maintain confidentiality of data. Some 94% of the responses indicated interest or willingness to participate should the index be established, if only the responses from industry are reviewed the percentage rises to 96%. However, prorating these responses back to the entire membership in Canada the figure of 26% is arrived at for those either willing or interested.

The committee on computer applications would like to take this opportunity to thank all those who kindly made time available to answer the questionnaire, without your effort this review would have been impossible. To any of our members who still have the questionnaire but have not mailed it back to us please do so as it is not too late for inclusion in the final assessment. Many of these initial notes may seem to state the obvious, but now we have some numbers to attach to the obvious features. The questionnaires are currently being rendered into punched card form and a thorough analysis of the responses will commence in September with the aid, as if it was necessary to say, of the ever present computer.

Area	Mailed	Rec'd.	% Return	Dupl.	Industry Mailed	Industry Rec'd.	Industry % Return	University Mailed	University Rec'd.	University % Return	Government Mailed	Government Rec'd.	Government % Return
Canada	134	35	26	2		25			6			4	
U.S.A.	66	29	44	3		18			6			5	
Australia	23	10	43	1		10			0			0	
Europe	78	19	24	1		8			2			9	
S. Africa	20	6	30			5			1			0	
Total	321	99	31	7		66			15			18	

TABLE 1: Analysis of returns to questionnaire.

Organization	Replies No.	Replies %	E.D.P. Users No.	E.D.P. Users %	Geochem. Usage No.	Geochem. Usage %	Anal. Appln. No.	Anal. Appln. %	Plotting Usage No.	Plotting Usage %	Uni-& Bi- Variate No.	Uni-& Bi- Variate %	Multivariate No.	Multivariate %
Industry	66	67	54	82	40	74	34	85	32	80	36	90	24	60
Universities	15	15	15	100	15	100	12	80	9	60	14	93	10	67
Government	18	18	14	78	14	100	14	100	12	86	14	100	6	43
Total	99		83		69	83	60	87	53	77	64	93	40	58
Assumed Extrapolation	300		83	28	69	23								

TABLE 2: Usage of Electronic data processing.

		Replies		E.D.P. Users in gp.		Geochem. Usage		Anal. Appln.		Plotter Usage		Uni-& Bi-Variate		Multivariate	
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
AUSTRALIA	Industry	10		8	80	7	86	6	86	6	86	7	100	5	71
	Government	0													
	University	0													
CANADA	Industry	25	71	24	96	17	74	15	88	13	76	14	82	9	53
	University	6	17	6	100	6	100	4	67	6	100	5	83	4	67
	Government	4	11	3	100	3	100	3	100	3	100	3	100	2	67
	Total	35													
EUROPE	Industry	8	42	6	75	4	67	3	75	4	100	4	100	3	75
	University	2	11	2	100	2	100	2	100	1	50	2	100	1	50
	Government	9	47	8	89	8	100	8	100	7	87	8	100	3	37
	Total	19													
SOUTHERN AFRICA	Industry	5	83	4	80	2	50	1	50	1	50	2	100	2	100
	University	1	17	1	100	1	100	0	0	0	0	1	100	1	100
	Government	0													
	Total	6													
U.S.A.	Industry	18	62	12	67	10	83	9	90	8	80	9	90	5	50
	University	6	21	6	100	6	100	6	100	2	33	6	100	4	67
	Government	5	17	3	100	3	100	3	100	2	67	3	100	1	33
	Total	29													

*NOTE: (1) Account has been taken of multiple replies from a single operating unit.
(2) The United Nations Resources and Transport Division is included in this group as it is physically in the U.S.A. and works in co-ordination with Governments.

TABLE 3: Analysis of E.D.P. Usage by area and type of organization.

Organization	No Reply		No		Maybe		Yes	
	No.	%	No.	%	No.	%	No.	%
Industry	0	0	1	4	14	58	9	38
University	1	17	0	0	2	33	3	50
Government	0	0	0	0	1	33	2	67
Total	1	3	1	3	17	52	14	42

TABLE 4: Analysis of interest in geochemical index in Canada.

Constitution Committee — Chairman: J. A. Coope

Members: W. F. Bondar (Canada), R. H. Carpenter (U.S.A.), S. Dijkstra (Europe), P. R. Donovan (Australia), R. F. Horsnail (Canada), J. H. McCarthy (U.S.A.)

As directed by the Council the Consititution Committee is critically reviewing the present constitution, soliciting Council for their suggestions and comment on suggested revisions, and recommending new by-laws. Changes being considered are mainly concerned with the make-up and term of office of the council and executive, definitive of member classes and streamlining of admission procedures. On the basis of the review new by-laws would be drafted and submitted for vote at the next annual meeting. Procedures to streamline the admittance procedures will be drafted and the revisions circulated in the next newsletter.

Publications Committee — Chairman: E. Cameron

Members: B. Bolviken (Norway), M. Dall'Aglio (Italy), P. R. Donovan (Australia), J. H. McCarthy (U.S.A.), D. D. Runnels (U.S.A.)

There was a very encouraging response to the recent questionnaire on the proposed Journal of Geochemical Exploration. To date 101 replies have been received, the great majority of which favour its establishment.

	Yes	No	No Reply	Undecided
1. Do you favour the A.E.G. sponsoring a Journal of Geochemical Exploration	94	6	1	
2. Do you feel that this Journal should publish letters to the Editor?	81	13	6	1
Publish news of the Association?	83	9	7	2
3. Would you be willing to subscribe to the Journal as part of your annual dues, the additional cost being $20 or less?	88	8	4	1
4. Would you anticipate submitting a paper to the Journal?				
In 1971	7	34	54	6
1972	35	21	33	12
1973	35	11	35	20
5. Would you be willing to take an active part in the Journal by, say, refereeing papers?	72	13	15	1

We are grateful that so many members of the Association took the time to reply to the questionnaire and to add thoughtful comments. It was apparent from these comments that the journal must serve two types of readers. The first carry out R & D in exploration geochemistry and wish to exchange basic data and ideas on new developments. The concern of the second, and more numerous, group is to find mineral deposits; exploration geochemistry is a means to an end. For this group, the journal should provide practical information. A number of suggestions were received to serve this need: devote an issue to a particular topic; publish a limited amount of case histories; review articles; articles on a broad range of methods that might be applied to a particular country or region.

Since there is a clear mandate to publish the journal, members and others may wish to consider submitting their future papers on exploration geochemistry and related topics to the journal. Since the first issue will hopefully be published in the summer of 1972, articles for the first issue should be submitted by the end of this year.

A draft agreement to publish the Journal of Geochemical Exploration has been received from a leading European publishing house. This agreement will require further negotiation and amendment before it can be considered for acceptance by the Association. These negotiations are time consuming and in the interim the possibility of the Association obtaining grants and subsidies which might allow it to publish this journal independently of a publishing house is being actively investigated.