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A SHORT HISTORY OF THE GEOTHERMAL INSTITUTE AND THE NEW ZEALAND GEOTHERMAL WORKSHOPS 1979-1988

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The 10th New Zealand Geothermal Workshop (2-4 November 1988) coincides with the completion of the 10th Geothermal Diploma Course; such courses have been held annually at the Geothermal Institute since 1979. There is a close connection between the NZ Geothermal Workshop, the Geothermal Institute and the NZ geothermal community; without the establishment of the Geothermal Institute, which is described by foundation members elsewhere in these Proceedings, there would have been no opportunity to call the first NZ Geothermal Workshop (in October 1979). In hindsight one can add that without the support of the NZ geothermal community and without the standard of presentation achieved during the first workshop, there would have been little chance to celebrate this 10th anniversary of the workshop series.

The Geothermal Institute at the University of Auckland

The Institute was founded officially on 1st August 1978 after a contract (INT/76/007) with the United Nations Development Programme had been signed. Between August 1978 and January 1979 Assoc. Prof. Derek Freeston and Assoc. Prof. Pat Browne became full staff members (I became the Honorary Director); Mrs Shirley Forde joined us as Administrative Assistant, Mrs Beverley Blackwell was the first secretary, and Mr Ed Pak our first technician. On 15th February 1979 the students of the first Geothermal Diploma Course enrolled: 19 UNDP sponsored fellows and 5 NZ students. The first classes until June 1979 were held in an old building vacated by the English Department, soon to be pulled down to make space for the new Arts Building. Prof. Nick Brothers had offered accommodation for the Institute in the Symonds Street wing of the new School of Architecture building which had been allocated to the Geology Department. The official opening of the Institute in the Architecture building took place on 15th June 1979 in the presence of the Deputy Prime Minister, the Hon. Mr Talboys.

We were lucky in having a highly motivated group in the first Diploma course. The input of the NZ students was significant since they soon took over the role of informal tutors; I like to recall the moderating influence of our first female student (Margarita Letelier from Chile) and ever since, we have noticed the same effects of other female students who succeeded Margarita. The age composition of the first student group was inhomogeneous (between 21 and 44 years); so was their academic background. But by continuous efforts each student but one succeeded in passing the final examinations. We said farewell to most students on 24th October, the closing day of the first NZ Geothermal Workshop. Two students, Dayun Peng from China and Ian Bogie of NZ remained with us and became affiliated with the Institute as our first geothermal graduate students, having enrolled with the Geology Department as M.Sc students; Dayun Peng (now Vice-President of the Geological College, Chengoln, Sichuan) became the first graduate when he finished his study course in 1980. We are very pleased to have with us at this 10th Geothermal Workshop Prof. Zhijie Liao (University of Beijing), a member of the 1979 Diploma class.

1980 was the last year covered by the first UNDP contract; again we enrolled 19 foreign students sponsored by a UNDP fellowship and 7 NZ students (our largest New Zealand group ever since). The course was started under a cloud of uncertainty and none of us knew what would happen at the end of the year. The most important event that year was probably the 1980 Training Mission organised jointly by UNDP and MFA to assess the impact of the Auckland training and to find whether there was any further demand for a similar course. Dick Bolton and I participated in this mission, the results (Bolton and Hochstein, 1980; Freeston and Hochstein, 1980) showed that our training fulfilled existing training demands and that there was need for similar training of at least 60 candidates in developing countries between 1981 and 1983. As a result, the first contract was extended by one year to cover the 1981 course. With the experience of the 1979 course, teaching of the 1980 course was easier; our handout notes (total of 700 pages) were completed and the course finished with a farewell ceremony on the last day (5th November 1980) of the 1980 NZ Geothermal Workshop.

Prof. Yuwen Cheng (Hobei College, China) and Mr Wilfredo Algopera (PNOC, Philippines) are here with us as members of the 1980 class.

I remember 1981 as the year taken up by further negotiations with UNDP and MFA about the details of the new contract for the 1982-1984 period. We were lucky in having Mr Bruce Harland from UNDP as negotiator who tried hard to secure future funding by involving MFA. Demand for geothermal training had increased as a result of two new geothermal projects in Indonesia and the Philippines which were sponsored by the NZ Aid Programme; MFA pledged therefore support for funding of up to 6 (later 10) candidates from these countries to attend the Diploma course which explains the strong component of students from both countries shown in Table 1. With the new "life" of the second UNDP-MFA contract (INT/81/023) we were able to enlist the help of Dr Robert McKibbin (TAM Dept., School of Engineering) who on a half lectureship helped Derek to cover the engineering topics of the course; I was appointed as full-time Director and could relinquish most of my teaching in the Geology Department. We also were lucky to appoint Mr Grant Caldwell on a half junior lectureship who also organised all computing facilities within the Institute. Our budget was still slender and I remember gratefully the assistance of Mr Neville Dench (GENZL) for a grant-in-aid which allowed us to buy our first desk-top computer (an HP-45) in 1981. All earlier students still remember the long waiting list to use our first computer and those at the Computer Centre during their project time. There was one particular problem which caused us great concern: we still had a significant failure rate (up to 10%) and in many cases, these failures could be attributed to the poor English of the candidates. Although we had increased English tutoring during the first term of the course, there was a limit to English training since we could not reduce the content of the course. We had no solution for this problem at that time. Minor staff changes occurred during this time; Beverley and Shirley left us in 1981 with Mary Weston taking over the secretary job and Oscar Huijsse the administration; we are pleased that both are still with us today.

We are also pleased to have with us Mr Charles Haukwa (KPC, Kenya) and Mr Sayaji Sudarman (Pertamina, Indonesia) as representatives of the 1981 course.

At the end of 1981 Assoc. Prof. Derek Freeston went on study leave and spent a significant amount of time visiting geothermal projects in China and the Philippines giving informal and formal lectures. Most of the staff of the Institute followed Derek's example when it was their turn for leave. Since 1981 staff of the Institute have spent about 20 months of the total leave on visits to developing countries, carrying parts of our course to those who wanted to have further information. Derek and the rest of us were always impressed by the hospitality and loyalty of our ex-students as we developed "Continuing Education" as part of our study leave, gaining at the same time valuable information which could be used in the Diploma course.

The period of 1982 to 1984 was one of small but continuing development of the syllabus. The group of graduate students affiliated with the Institute steadily increased up to 15 which was then considered to be the optimum number which could be supervised by Institute staff. A second Review Mission was held in 1983 to assess the impact of training at Auckland. The results of this

review, for which detailed questionnaires were used, have also been published (Hochstein, 1984; Hochstein and Freeston, 1985). Valuable information as to the strength and weaknesses of the course were obtained and led to some significant changes, for example the introduction of 3 months English training at Victoria University (Wellington) prior to the annual Diploma course which was started in November 1983 for 12 candidates who later attended the 1984 Diploma course. To reduce the stigma of failing the Diploma course, which had caused us some concern, a second academic qualification was introduced in 1984, the Certificate in Geothermal Energy Technology, which could be awarded to candidates who passed two-thirds of the Diploma papers. With the new quinquennial grant, the University of Auckland was able to contribute to the funding of the Institute (covering part of the annual fixed costs). It became obvious, however, during the negotiations in 1983 which continued until 1984, that the Division of Global and Inter-regional Projects (DGIP) at UNDP which had funded the first two contracts was unable to continue with inputs to the fixed costs of the Institute; this was in line with UNDP policy to make seeding grants available to initiate projects but to reduce inputs later on to avoid continuous funding of institutions. Fortunately our MFA stepped in and took over some of the fixed costs for the period of 1985-1987; with these arrangements the third phase of the project could be started (UNDP-MFA Contract INT/84/011).

The geothermal developments in New Zealand and those sponsored by the NZ Aid Programme started to decline from 1984 onwards. As a result, demand for training of NZ Diploma students decreased and from 1984 to 1988 only a total of 9 New Zealand students enrolled in the Diploma course, whereas from 1979 to 1983 we had 24 NZ students. In 1984 the Institute was attached to the School of Engineering for administrative purposes. The period 1984 to 1987 saw not many changes, the annual intake of Diploma students remaining about constant. From 1984 onwards, however, we saw more Masters students who usually enrolled only for one paper of the Diploma course (until 1988 about 25 Master students passed through the classes). Again their input was invaluable since most of them took on willingly their role as informal tutors. At the end of 1986 Dr Keith Nicholson joined the Institute to undertake all teaching of geochemistry topics. Grant Caldwell left us in 1986 and Stuart Henrys took over Grant's duties. Ed Pak had left us in 1985 and John Watson came to us as technician until 1986 when Ashley Franklyn took over from John.

At the beginning of 1987, UNDP made efforts to change funding from central funds to country funds, assuming that UNDP country offices would be willing to arrange for funding of fellowships on the "user pays" principle. Unfortunately, there has been a great reluctance by UNDP country offices to allocate some of their funds for geothermal training except in the case of geothermal country projects which have a built-in training component. In October 1987 we were faced with the situation that only 4 UNDP candidates had obtained sponsorship for the 1988 course. To avoid the situation that the 1988 Diploma course had to be cancelled, MFA (Wellington) offered immediate financial support for all other UNDP fellows. In February 1988 UNDP (New York) agreed to extend funding of fellowships for the 1988 and 1989 courses. We are therefore in a situation that funding of future courses beyond 1989 is still uncertain although both sponsors agree that the course be continued.

Since 1984 we have received requests for further specialised geothermal training. Although most of the graduates affiliated to the Institute receive such training, the output has been modest (on the average 3-4 graduates finish their study courses per year). We have been aware, although about 50% of the Diploma study course at Auckland constitutes already specialised training, that sooner or later separate short training courses had to be considered. In 1986 we were approached by Dick Bolton (then NZ Embassy, Jakarta) to consider a short-term course in reservoir engineering. Funding for the pilot scheme course was made available by MFA and a 3-month reservoir engineering course was held during the second half of 1988; this was organised by Robert McKibbin and was attended by 6 candidates from three developing countries. Depending on the evaluation of this first short-term course, similar courses will be considered in the future.

A recent analysis (Fanelli and Dickson, 1988) of the standing of the Geothermal Diploma course at Auckland and its impact on the international scene shows that about 30% of all students from developing countries who were trained in geothermal technology at the four international centres (Iceland, Italy, Japan and New Zealand) between 1970 and 1986 were trained at Auckland.

It can be seen from Table 1 that during the last 10 years we have trained mainly candidates from Asia, Indonesia and the Philippines (about 63% of all our foreign students). In comparison with similar data which includes foreign students who received geothermal training at all international centres between 1970 and 1986, the composition of our student group appears to be similar to that of all four centres, except that we have seen too few students from Latin American countries. Since the regional composition of candidates is similar to the distribution of UNDP funding of regional geothermal projects (Helmke, 1988), we believe that the Institute has done its share in training fellows for a new technology satisfying a worldwide demand.

To enable us to continue, we would appreciate the support of all participants who have come together for this 10th Geothermal Workshop. At the same time we would like to thank everybody who contributed to the Diploma course and who made it possible that we reached this milestone.

TABLE 1: Composition of Geothermal Diploma Students trained at Auckland 1979-1988.

Period	No.	Asia	Philippines & Indonesia	Latin America	Africa	Europe	N Z
1979-83	131	21	44	15	23	4	24
1984-88	141	23	62	22	20	5	9
Total:	272	44	106	37	43	9	33

Percentage of foreign students (Auckland) - (239 students between 1979-1988):

63% from Asia/Philippines & Indonesia,
15% from Latin America,
18% from Africa,
4% from Europe.

Percentage of foreign students (Iceland, Japan, Italy, New Zealand)
(709 students between 1970-1986):

51% from Asia/Philippines & Indonesia.
27% from Latin America,
16% from Africa,
6% from Europe.

The New Zealand Geothermal Workshops

The workshops started with the first Geothermal Diploma Course held in 1979. The idea was to invite all visiting lecturers who had contributed to the course to meet in Auckland at the conclusion and to have a poster session where Diploma students could present results of their projects, so that all visiting lecturers could see whether their efforts in teaching had been successful. About 40% of all lectures of the first Diploma Course had been given by about 45 NZ scientists and engineers from various Government departments and the NZ private industry. Their response to having a re-union at the end of the first Diploma Course was very positive; most of those 20 lecturers from this university who had contributed to the course were happy to join in. The next step went beyond the idea of a re-union of lecturers and Diploma students when staff of the Institute suggested calling a conference at which papers covering both earth science and engineering disciplines would be presented, since a significant part of the NZ geothermal community would come together at this re-union of lecturers. Although NZ scientists and engineers had attended international geothermal conferences in the past, the idea of calling a NZ geothermal conference and to involve professionals from all disciplines was a new one. The proposal to extend the re-union to a geothermal conference found wide support.

We were fortunate to find at the right time both an organiser and an "organising institution". Dr Roland Home (then School of Engineering, now Stanford University) had taken much interest in the 1979 Diploma Course by giving lectures covering reservoir engineering aspects. Roland had attended some of the earlier geothermal workshops held annually at Stanford University (USA) and proposed that we should follow the Stanford example - he was willing to organise the first conference which, following the Stanford model, became the "New Zealand Geothermal Workshop 1979". Roland also suggested that we should issue pre-prints of the papers to be presented and to issue all papers in the form of a volume of "Proceedings" at the beginning of the workshop so that the Diploma students could take a copy of all papers back home. We were also lucky in getting the support of Mr E.P. Malone, Director of the Centre for Continuing Educatipn, University of Auckland which undertook to print all invitations, to produce the Proceedings of the first workshop and to arrange facilities. The Centre has continued to arrange the annual workshops ever since.

The first workshop was held from the 29-31 October 1979, and it was a success. The format of the first Proceedings, now an antiquarian rarity, was not very professional in its layout (with its "sideways" A4 format) but it contained 35 papers from NZ authors, 2 papers from overseas, and 5 contributions from Diploma students summarising their project work. The first workshop was attended by about 100 people, about 60% of the audience being lecturers who had contributed to the course and Diploma students - it was a re-union in the end.

The NZ Geothermal Workshops continued, although nobody who attended the first workshop anticipated that we might reach the 10th anniversary of this event. The continuation of the Workshops has been closely linked with the continuation of the Geothermal Diploma Course, since in all later years visiting lecturers and Diploma students still formed the core of the audience. But there have been some interesting developments.

The format of the Proceedings was changed to its present one in 1980. As a result of the already significant number of papers dealing specifically with geothermal developments in developing countries, UNDP made a grant available in 1981 assisting with the production and distribution of the Proceedings to organisations in developing countries. This grant was increased in 1984 and about 140 copies of the Proceedings are now mailed to developing countries every year.

Circulation of the Proceedings has always been limited since they were produced mainly for participants, the NZ geothermal community and the Diploma students; in 1981 circulation was increased to about 250 copies. However, demand from overseas made it necessary to reprint most issues of the earlier Proceedings. From 1980 onwards the Auckland Workshops were organised by Institute staff in a somewhat rotating order and I would like to thank especially Assoc. Prof. Derek Freeston, Assoc. Prof. Pat Browne and Dr Robert McKibbin who put much effort into the organisation of the workshops and the production of the Proceedings. Most papers submitted for publication have been accepted on merit and were not refereed because of time limitations; only papers by Diploma, graduate, and ex-Diploma students were internally refereed.

The history, and the development of the NZ Geothermal Workshop is summarised in Table 2 where topics of the published papers have been grouped under three subjects, namely studies specific to NZ geothermal fields, studies of overseas geothermal fields, and papers unrelated to specific aspects of a geothermal field. The composition of authors is also shown; papers involving Diploma, graduate and ex-Diploma students are shown separately. The table indicates some interesting developments, namely:

(a) the number of papers published in the Proceedings has remained about constant since 1979 except for the 1982 Workshop, which was incorporated with the 1982 Pacific Geothermal Conference, and this, the 10th Workshop. The proportion of papers dealing with earth science and engineering topics has also remained about constant.

(b) Taken over 5 year intervals the number of papers dealing with specific aspects of NZ geothermal fields has decreased whereas the number of papers describing similar aspects of overseas geothermal fields has continuously increased.

(c) The number of senior authors from overseas has also increased and equals the number of NZ authors in the 1988 Proceedings. Since most of the Diploma and ex-Diploma students who published their research work in the Proceedings are from overseas, the number of New Zealand authors has equalled that of overseas authors during the last 5 years.

TABLE 2 (a) Content of papers published in the Proceedings of the N.Z. Geothermal Workshops 1979-1988.

Period	Total Papers	Earth Science topics	Eng. topics	Other topics	N Z fields	overseas fields	non-field related
1979-83	235	108	96	31	69	68	98
1984-88	232	116	94	23	55	92	85

(b) Composition of authors of papers published in the Proceedings

Period	Total papers	N.Z. authors	overseas authors	Diploma students Graduates, ex-Diploma students
1979-83	235	150	51	34
1984-88	232	118	77	37

It appears therefore that the Proceedings, despite their limited circulation, have changed from a publication carried mainly by NZ authors to a publication carried by an international group of authors. For this reason the organisers of die 1988 Workshop have decided to add an index list of all papers published in the Proceedings between 1979 and 1988 at the end of this volume.

For teaching purposes, the Proceedings have been very valuable to all lecturers contributing to the Diploma Course. For up-to-date information about geothermal developments in many developing countries, we often go back to the Proceedings. For example, the developments in China, Ethiopia, Kenya, the Philippines and also many developments in Central America and Japan have been covered by many papers which were published first in the Proceedings of the NZ Geothermal Workshop.

The Proceedings have, in part, closed the gap between geothermal developments in New Zealand and those occurring in other parts of the world. We hope that this form of communication and sharing of experience will continue and that all participants who attend this 10th New Zealand Geothermal Workshop will continue with their support of an annual meeting which originally started as a re-union of lecturers and Diploma students.

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