

COMMISSION OF THE EUROPEAN COMMUNITIES

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URANIUM EXPLORATION IN THE COMMUNITY

SECOND PROGRESS REPORT

AND

ORIENTATIONS FOR THE FUTURE

(Communication from the Commission to the Council)

COM(83) 169 final

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1. Summary

1.1 The Commission has provided financial support to uranium prospecting projects in the territories of the Member States since 1976. A first progress report ⁽¹⁾ was presented in 1979. The basis for the support scheme is the Commission's Regulation (Euratom) 2014/76 ⁽²⁾.

This Regulation :

a) outlines the goals of a Community action in this field, which are :

- taking into account the 80% dependence of the Community on external uranium supplies, to support the evaluation of the uranium resources in the Community. Development of these resources would further diversify the sources of supply and thus contribute to the long-term security of supply of the Community;
- to encourage the mining industry to intensify its exploration efforts by partial financial support to offset some of the inherent financial risks of such activities;

b) sets out conditions, as required by Article 70 of the Euratom Treaty, for giving financial aid from the Community's budget to uranium prospecting projects.

1.2 Community support has extended over 6 years and a substantial number of projects have been finalised during this period. It is therefore possible to review the results obtained till now and draw conclusions.

1.3 The first part of this communication provides a review of the exploration projects to date. These projects were carried out in close cooperation with expert geologists of the national administrations. Also information from the programme of R&D in uranium exploration techniques and ore processing was injected into this exercise. Although results obtained necessarily differ from country to country, the overall assessment of the action is positive for the following reasons :-

(1) COM(79)90 final

(2) OJ of the EC No L 221 of 14.8.1976

- through this programme already over 33,000 tonnes of new uranium resources (reasonably assured and estimated additional) have been identified (1);
- further to the resources already identified, several new areas with significant uranium potential have been outlined;
- a better knowledge of the timescale and costs of developing these new sources of uranium supply has been acquired, therefore in case of exploitation, lead times will be shorter;
- the information derived from the exploration projects carried out in the Community helps provide the basis for exploration methodology in third countries;
- finally, the work carried out has shown that uranium exploration need have no lasting detrimental effects on the environment.

1.4 The second part of this communication outlines the rationale for the Commission continuing this action. However, in the light of results achieved so far, it is proposed to modify some of the guidelines governing the programme.

The Commission believes that a continued exploration effort is required to improve assurance of supply over the long term. The present situation of surplus uranium production capacity has reduced drastically the volume of uranium exploration worldwide. It would be contrary to the Community's longer term interests of securing nuclear fuel supplies to follow this worldwide trend in exploration activities and stop half-way the current effort to evaluate properly the uranium resources in the Member States. Termination of the programme would not only put at risk the full analysis of the results obtained so far, but also be contrary to the intention expressed by the Commission in its recent communication : An energy strategy for the Community : the nuclear aspects (COM(82)36). Proposals on the support of uranium exploration in third countries will follow⁽²⁾.

(1) Comprising : F.R. Germany 2,000 tonnes, Italy 3,000 tonnes, Greenland (Denmark) 28,500 tonnes. This would represent, if produced, enough uranium to cover the requirements of at least 30 PWR nuclear plants (1000 MWe) during the whole of their expected lifetime (ca 30 years).

(2) This extension is proposed as a proposition to the Council within the modifications proposed on Chapter VI of the Euratom Treaty. Because of this, the implications of this proposal are not considered in this document.

In future, it is proposed that the Community's financial support will not apply to general geological surveys such as it has mainly supported during the period 1976-1981. It is proposed to concentrate further financial support on specific geological target areas which have been shown to have particular uranium potential from the current programme.

It is proposed that the level of spending should be 10 MECU a year which, taking into account inflation since 1976, corresponds to a level of expenditure equivalent to that for the period 1976-1981^(*).

2. Review of exploration programmes 1976-1981

2.1 Implementation

2.11 The Commission Regulation (Euratom) 2014/76 mentioned in paragraph 1.1 identifies the aims and conditions of the Community's support of uranium exploration projects.

It describes the main types of exploration activity which can benefit from such Community support, namely :

- regional uranium exploration
- local uranium evaluation
- evaluation of uranium occurrences.

The Commission has supported 58 projects in these fields with aid totalling 27.5 million ECU from 1976-1981. It has been a basic guiding principle that Community aid should effectively complement and not replace national and private financial support.

2.12 Community support for projects has varied between 30% and 70%. The higher percentage has been awarded to projects in their initial stages where the financial risk is highest and maximum encouragement is needed to get projects underway.

(*) 27.5 million ECU.

2.13 Since the adoption in 1976 of the regulation, 5 calls for submission of uranium exploration projects have appeared in the Official Journal of the European Communities.

2.14 On the basis of the applications received, the Commission has selected each year a number of projects as follows ⁽¹⁾:

<u>Year</u>	<u>Applications for support</u>	<u>Projects selected for support</u>	<u>Amount of support</u> MECU
1976	12	7	1
1977	20	13	5
1978	18	9	5
1979	18	13	5
1980	20	12	9
1981		4 ⁽²⁾	2.5 ⁽³⁾
<u>Total</u>		<u>58</u>	<u>27.5</u>

2.15 It has not been possible for the Commission to support all the projects submitted. In order to arrive at a careful selection of projects for support, a two-stage procedure was followed. Projects were first carefully examined by the Commission services. In a second stage the Commission was assisted in the project evaluation by an expert group of uranium geologists from the Member States.

2.2 Overall assessment of the achievements and effectiveness of programme

2.21 The primary objective of this action was not only to outline new uranium reserves, but also to estimate the level of sub-economic uranium resources in the Community and thus the total uranium potential of the Community. This has been done in a unique exercise where the Commission services, aided by consultants and uranium experts from the Member States have worked together in continually evaluating the results of the programmes. They have visited most of the significant uranium

- (1) See in Annex 1 set of tables showing projects financed country by country.
 (2) This total is made up of the continuation of 3 projects already chosen for support in 1980 and a new project in the new Member State of the Community, Greece.
 (3) This support was made possible through a transfer of 1.2 million ECU from the overall budget for energy and 1.3 million ECU made available from projects terminated earlier than foreseen.

occurrences found during the programme and jointly made recommendations to those carrying out the work and to the Commission. The individuals concerned have built up over the years a significant expertise in evaluating the projects and have thus been able to coordinate this evaluation of the potential of the Community. The results of this work are detailed in the individual country assessments (see Annex 2). The final reports from all the projects will, in due course, be put on open file by the Commission.

2.3 Environmental impact of uranium exploration

Throughout the Community, questions have been raised as to whether uranium exploration may have a harmful effect on the environment. The regional uranium exploration programmes supported so far have indicated a wide range of naturally occurring values for uranium and its daughter products in rocks, soils, water and the air. None of these programmes has had any lasting detrimental effects on the environment. In fact, in many countries, for example Ireland, although in some areas there has been significant local opposition, the exploration programmes concerned have provided valuable base data on the environment. Though in the later stages of uranium exploration, drilling, trenching and underground workings may be carried out, there is no reason for there to be any detrimental effects from them on the environment.

There is no evidence from the Commission's programmes that any form of exploration activity necessarily increases beyond the natural variation already found in nature the amounts of radiation due to uranium and its daughter products.

3. Future programme

3.1 General situation of uranium supply and demand and its effect on exploration

3.11 Expectations in the early 1970s as regards nuclear power development have brought about a situation in the world where uranium production capacity is for the time being in excess of uranium demand. As a

consequence, spot uranium prices⁽¹⁾ have dropped sharply from about \$ 40/lb of uranium in the late 1970s to less than half of this figure today. There is little reason to believe that the state of the market will change significantly in the short to medium term.

3.12 The existing situation of weak demand will lead suppliers to correct the imbalance. Already a number of uranium mines producing at high cost are being closed down. This narrows the available sources of supply. Second, because demand for uranium is weaker than foreseen and because current price levels reduce the profitability of uranium production, uranium exploration is being seen as less urgent and largely oriented towards low-cost uranium targets, for example in Australia and Canada.

3.13 In effect, a decrease in uranium exploration activity can be observed worldwide. All of the present exploration is oriented towards "low-cost" uranium targets, virtually none of which are located in the Community.

Thus, the longer term effect on the supply structure could well be an increasing concentration of uranium production capacity to a few producers.

3.14 Because the Community is a major user of uranium, of which by far the largest share will have to be imported, the current reduction in exploration activity worldwide must be assessed seriously for its impact on the future level and structure of supplies and therefore on the long-term supply security.

3.15 The Commission intends therefore to continue to support an adequate level of exploration effort on the lines described in the following.

(1) The spot market only represents up to 10% of the total uranium market. Prices in long-term contracts are now also showing signs of being renegotiated downwards.

3.2 New programme orientation

3.21 A study⁽¹⁾ on the uranium potential of the EC countries carried out for the Commission indicates a significant potential for new discoveries within the Community. Uranium geologists from the Member States have endorsed this opinion.

3.22 The Community-supported projects have shown that the new uranium resources identified mainly in Greenland, Italy and Germany could, if developed, make substantial additions to the uranium resource base in the Community. Further Commission support is likely to lead to more discoveries, in the areas mentioned and in other favourable areas, e.g. Greece.

3.23 The most promising approach for the coming years will be to concentrate on the evaluation of those primary uranium occurrences that have already been identified.

Development of the uranium resources identified would have positive implications for employment and the balance of payments of the Community.

3.3 Targets

3.31 The Commission believes that for the near future the following types of mineralisation should form the mainstay of the Community's support :

- a) uranium mineralisation associated with high-level intrusions
- b) volcanogenic uranium deposits
- c) contact metamorphic deposits
- d) uranium associated with continental sediments.

3.32 The reason is that the major discoveries made in the Community since 1976 all fall within these four types. They host all the significant indications of uranium mineralisation that have been outlined in programmes supported by the Commission.

⁽¹⁾ Bowie S.H.U. : Uranium Potential of the EEC Countries, 31 December 1979.

3.33 It is not precluded that there will be uranium discoveries in other types of deposit in the short to medium term, but there will need to be significant advances in research and development in uranium exploration techniques and uranium ore processing before exploration for other types of deposit becomes viable.

3.34 In its future calls for applications for Community support the Commission intends to include that priority will be given to uranium exploration proposals aimed at the discovery of these four types of deposit.

3.4 Programme Implementation

intends to

3.41 The Commission / continue to provide support for uranium exploration projects on the basis of the Commission Regulation (Euratom) 2014/76.

3.42 An expert group of uranium geologists from the Member States should continue to advise on the selection of project applications.

3.43 On the basis of the experience gained so far, the expert group has supported a number of technical and administrative recommendations which would improve the programme's execution. The Commission intends to take advantage of these recommendations in future.

3.5 Budget

3.51 The Commission estimates that a continuation of support on the lines described will need a support of approximately 10 million ECU per year.

3.52 Support at this level would enable the Commission to support the most promising projects and maintain present practice as regards the share of Community support to the individual project.

In the light of the progress of discussions now taking place on Community policy on supply of nuclear fuels, more ambitious objectives could be followed in future, when account is also taken of the possibility of extending Community funds to prospecting outside the Community.

3.53 Currently this range is 30-70% of total exploration costs, but the typical Community share of support ranges from 30%-50%. Higher levels of support will go to programmes in their initial reconnaissance phase, when chance of success is least certain. Lower support levels apply to programmes in their detailed evaluation stage, when already the basic economic parameters have been determined.

3.6 Mechanisms of Programme

It is proposed that, following the identification of the geological targets, a call for applications will be made in the Official Journal of the European Communities with specific reference to these targets. As is present practice, the organisations within the Community will be given a list of headings to reply to in their description of the project. These headings are covered in the current Commission Regulation (Euratom) 2014/76.

3.7 Management

Following receipt of the programmes, the Commission services, with the aid of consultants, will review and make preliminary comments on the projects. Following this, all the projects received will be tabled to an advisory group of geologists who will aid the Commission in the final selection of programmes. Having taken the advice of this group, the Commission will propose which projects will be supported within the available budget.

ANNEX 1 - TABLES

Euratom Article 70 - 1976 round of funding

in u.c.

No	Name of project	Location of project	Organisation	Total cost EUA	% Commission participation	Total funding
1	Kvanefjeld	Denmark (Greenland)	Geological Survey of Greenland	906.667	30	272.000
2	Regional programme	Ireland	Irish Base Metals Ltd	165.984	63	104.570
3	Regional project	Ireland	Geological Survey of Ireland	28.800	50	14.400
4	Leinster Granite Survey	Ireland	Maugh Ltd	311.118	62	192.893
5	Marifunt	Italy	AGIP SpA	732.800	30	219.840
6	Orkney	United Kingdom	South of Scotland Electricity Board	325.800	50	162.900
7	Niedersachsen	RF Germany	Urangesellschaft mbH	95.420	35	33.397
					TOTAL	1.000.000

Euratom Article 70 - 1977 round of funding

in u.a.

No	Name of project	Location of project	Organisation	Total cost EUA	% Commission participation	Total funding
1	Uranium follow-up programme	Ireland	Irish Base Metals Ltd	551.400	60	330.840
2	Leinster project (Stage II)	Ireland	Maugh Ltd	1.631.015	45	729.110
3	Regional survey	Ireland	Geological Survey of Ireland	174.000	30	52.200
4	Fintona Block	United Kingdom (N. Ireland)	Minerex Ltd	198.000	50	99.000
5	Visé	Belgium	Université Libre de Bruxelles	168.722	39	66.000
6	Bayerischer Wald	FR Germany	Urangesellschaft mbH and Minatome SA	528.837	67.5	356.965
7	Niedersachsen	FR Germany	Urangesellschaft mbH	533.236	50	266.618
8	Oberpfalz	FR Germany	Saarberg-Interplan mbH	2.074.211	57	1.186.466
9	Mittelfranken	FR Germany	Saarberg-Interplan mbH	1.203.138	43	520.401
10	Kvanefjeld	Denmark (Greenland)	Geological Survey of Greenland	65.333	40	26.133
11	S. Greenland Regional programme	Denmark (Greenland)	Geological Survey of Greenland	669.334	65	435.067
12	Western Alps	Italy	AGIP SpA	1.184.000	30	355.200
13	Val Rendena	Italy	AGIP SpA	1.920.000	30	576.000

ARTICLE 70 - EURATOM TREATY

1978 round of funding

in UCE

Name of project	Country	Organisation	Funding		
			Total cost of project	% of Commission participation	Total Commission participation
Preliminary U Prospecting	Belgium	Union Minière	920,306	55	504,889
Allihies	Ireland	Minerex Ltd.	34,633	70	24,243
Val Rendena	Italy	A.G.I.P.	1,040,433	70	728,303
Western Alps	Italy	A.G.I.P.	1,089,845	70	762,892
URSEN	Netherlands	IRC International Resources Consultants	60,000	70	42,000
Cornwall-South of Scotland	U. Kingdom	Minatome	876,191	62	547,052
Bavarian Forest Field I and Field II	W. Germany	Deutsche BP	1,304,747	62	802,679
U exploration in the Schwarzwald	W. Germany	Uranerzbergbau	1,502,861	66	985,721
Keuper Württemberg	W. Germany	Urangesellschaft	941,622	63	592,852
TOTAL			7,770,638		4,990,631*

* The sum of 9,369 UCE has already been committed by written procedure No. 332(78)792 - article 321.

Euratom Article 70 - 1979 round of funding

in EUA^(*)

No	Name of project	Location of project	Organisation	Total cost EUA	% Commission participation	Total funding
1	Hessen	FR Germany	Saarberg-Interplan mbH	34.441	70	24.109
2	Kandertal	FR Germany	Saarberg-Interplan mbH	73.882	70	51.717
3	Structural localisation of uranium	Ireland	Geological Survey of Ireland	72.304	70	50.613
4	U exploration in Donegal and Kilkenny	Ireland	Irish Base Metals Ltd	374.334	60	224.600
5	Leinster	Ireland	Maugh Ltd	671.465	70	470.026
6	Uranium - Donegal	Ireland	Rio Tinto Finance and Exploration Ltd	28.490	70	19.943
7	Uranium - Galway and Kilkenny	Ireland	Rio Tinto Finance and Exploration Ltd	36.490	70	25.543
8	Val Vedello	Italy	AGIP SpA	4.740.717	42	1.994.513
9	Western Alps	Italy	AGIP SpA	1.924.537	45	866.042
10	Sardinia	Italy	AGIP SpA	1.112.347	70	778.643
11	Scotland	United Kingdom	Urangesellschaft mbH	274.367	70	192.057
12	U potential in Armagh and Down	United Kingdom	Ulster Base Metals Ltd	140.012	70	98.008
13	Narssaq Gamma-Ray Survey	Denmark (Greenland)	Risø National Laboratory and Geological Survey of Greenland	408.371	50	204.186
			TOTAL	9.855.605		5.000.000

(*) Exchange rate of 2 April 1979.

Duration Article 70 - 1980 round of funding

in MEA (*)

No	Name of project	Location of project	Organisation	Total cost EJA	% Commission participation	Total funding
1	Bayerischer Wald	FR Germany	Urangesellschaft/Minatone/ Deutsche BP	357,607	— 60	214,554
2	Oberpfalz	FR Germany	Saarberg-Interplan	3,460,292	60	2,076,175
3	Schwarzwald	FR Germany	Saarberg-Interplan	663,107	70	464,175
4	Donegal	Ireland	Irish Base Metals/Tara Prospecting	1,711,960	60	1,027,176
5	Kilkenny	Ireland	Irish Base Metals/Tara Prospecting	133,524	70	93,467
6	Leinster Unit IV	Ireland	Minatone/Maugh	428,571	70	300,000
7	Leinster Unit V	Ireland	Irish Base Metals/Maugh	537,023	70	375,916
8	Satellite Imagery Donegal	Ireland	Geological Survey of Ireland	103,505	70	72,454
9	Sardinia	Italy	AGIP	861,694	70	603,185
10	Val Vedello	Italy	AGIP	10,420,374	30	3,126,112
11	Western Alps	Italy	AGIP	577,910	70	404,537
12	Cornwall	United Kingdom	Charter Consolidated/ Minatone	346,054	70	242,238

(*) Conversion rate of 25 April 1980

Total : 9 MEA

Euratom Article 70 - 1981 round of funding

in ECU

No	Name of project	Location of project	Organisation	Total cost ECU	Total funding
1	Kavala	Greece	Greek Atomic Energy Commission	697,674	300,000
2	Sardinia	Italy	AGIP	826,198	550,000
3	Val Seriana	Italy	AGIP	1,238,886	850,000
4	Cornwall	United Kingdom	Charter Consolidated/Minatome	1,145,475	800,000

Individual Country Assessments

1. BELGIUM

Two preliminary uranium exploration programmes have been supported in Belgium. The first was a research programme to examine uranium mineralisation at Visé (Liège Province). A re-evaluation of the known uranium prospects in the Visé region was carried out plus new exploration in the region in order that any further uranium occurrences could be detected. The results of this programme indicated that the economic potential of the area was very limited and no further work was proposed.

The second project was a regional geochemical reconnaissance programme over the whole of the Belgian Paleozoic in order to provide a first picture of the distribution of uranium, and from this data base propose what further detailed research could be undertaken in particular zones. The project was coordinated by the Geological Survey of Belgium with the participation of the Université Catholique de Louvain, the Université Libre de Bruxelles and the Faculté Polytechnique de Mons. Radiometric, stream sediment and hydrogeochemical exploration methods were combined with advanced data processing techniques to evaluate the area's potential. In all 10,200 stream sediment samples, 2,400 water samples and 13,000 radiometric measurements were collected. A synthesis of this data indicated three main regions where the presence of numerous small anomalies seemed to reveal a more favourable geochemical or geological setting for uranium mineralisation. However, at present no further uranium exploration programmes have been proposed.

2. DENMARK

No projects have been supported on the mainland of Denmark due to its very limited uranium potential. However, the situation in Greenland is geologically more attractive for uranium mineralisation and significant results have been obtained through projects supported by the Commission. Initially the programmes in Greenland concentrated on developing the

potential of the Kvanefjeld deposit in the Ilimaussaq alkaline intrusive in south Greenland. Here Reasonably Assured Resources of uranium have been increased from 5,800 tonnes U to 28,500 tonnes U in the cost category \$ 80-130/kg U⁽¹⁾. Estimated Additional Resources in the same cost category have increased from 8,700 tonnes U to 16,000 tonnes U. However, before this deposit can be developed, more research is necessary on processing the ore as well as on studies of the economics of recovering by-product or co-product elements. Attention has also to be given to the adequate disposal of the fluorine content of the deposit.

However, more important are the new discoveries of uranium mineralisation in the rocks surrounding the alkaline intrusives of S.W. Greenland. These discoveries have increased the uranium potential of the area as the type of mineralisation discovered does not have the same processing problems as the uranium resources inside the Ilimaussaq intrusive.

3. FEDERAL REPUBLIC OF GERMANY

In Germany a significant amount of uranium exploration was supported before the Article 70 exercise was initiated. However, assistance under Article 70 was instrumental in expanding the evaluation of the uranium potential of the Federal Republic, both by supporting a number of regional exploration programmes and smaller specific evaluation programmes over areas that had already been outlined. This evaluation has been carried out by individual organisations acting either on their own or under joint ventures.

The main area of interest discovered so far is in the N.E. part of Bavaria near the Czechoslovakian border. Here, in the region of 2,000 tonnes of new uranium resources have been outlined. This discovery is particularly worthwhile as following this result the whole uranium potential of the immediate area associated with the metamorphosed crystalline basement is increased.

Other projects elsewhere in Germany, for example in the southern Black Forest, are continuing but it is too early to assess their results.

(1) Average grade 0.04% U.

4. GREECE

The Commission supported its first uranium exploration programme in Greece starting in 1981. The project, being carried out by the Greek Atomic Energy Commission, is situated in N.E. Greece and entails intensive uranium exploration in a number of specific areas. The first conclusions from this programme are expected in mid 1983.

5. FRANCE

No uranium exploration programmes have been supported by the Commission under the Euratom Treaty in France.

6. IRELAND

Before the initiation of the Community uranium exploration support programme, there had been only a very limited amount of uranium exploration carried out in Ireland. A total of 17 contracts have been concluded under this programme so far. The first actions supported in Ireland were regional surveys that had as their objective a first assessment of the whole country. From these programmes, it was apparent that two areas in Ireland had some potential for uranium mineralisation. These are the areas of the Leinster granite in S.E. Ireland and the Donegal granite in N.W. Ireland. It is too early to say whether the uranium mineralisation found in these two areas will eventually prove economic.

Of the two areas, it is the Donegal granite that has proved to be of most interest. A number of target areas for exploration in relation to this high-level granitic intrusion have been identified. These target areas are at present being evaluated.

In Donegal, local concern has been voiced as to the impact on the environment of the uranium exploration carried out. Because of this anxiety, particular care has been given to monitoring the activities of the organisations supported by the Commission and it has been ascertained that none of the exploration activities have had any long-term detrimental effect on the areas concerned. In fact, the results of the exploration programmes provide new data on the natural background levels of uranium and its

daughters in the areas surveyed.

In the Commission's view, it would be worthwhile continuing the evaluation of the uranium potential of the Donegal area.

7. ITALY

The uranium exploration programmes supported by the Commission in Italy have been concentrated in three main areas : the central northern Alps, the western Alps and Sardinia. To date, the most significant results have been in the central northern Alps where at Val Vedello the Commission's action has supported the identification of in the region of 3,000 tonnes of uranium resources. This development has particularly increased the potential of the central northern Alps.

In the western Alps, a number of uranium occurrences have been identified and work is concentrating on evaluating the uranium potential of these and re-evaluating areas with similar geology.

In Sardinia, the uranium potential is being assessed in the north and south of the island and it will take further work before drawing a conclusion on the importance of this potential.

The potential of volcanogenic uranium deposits in central Italy is being examined.

8. LUXEMBOURG

Although there appears to be some limited potential for uranium mineralisation in the continental sandstones of Luxembourg, no proposals for exploration have been received by the Commission.

9. NETHERLANDS

Following a comparison of the geology of the Netherlands with similar areas with uranium potential, one small programme was supported in order to assess the Netherlands' uranium potential. The results of this programme indicated that, although there were a number of small concentrations of uranium mainly associated with phosphatic material, there was little likelihood of finding adequate quantities of uranium for development under present economic conditions.

10. UNITED KINGDOM

Exploration supported through this action has been concentrated in Scotland and the south-west of England. These programmes followed on from the regional uranium exploration programmes carried out by the Institute of Geological Sciences. Although a number of areas of interest were identified in Scotland, since 1978 the major part of the exploration effort has been concentrated in the S.W. of England. Here a joint venture between British and French organisations has been examining uranium targets related to major fracture zones associated with the granites of S.W. England. Although good exploration targets have been identified, progress in testing these targets has been hampered by difficulties in identifying and securing adequate mineral rights over the areas of interest. These difficulties have added significantly to the costs of the programme. Following a period of three years mainly devoted to this problem, some progress is now being made in securing the mineral rights over a limited number of individual targets.