

## Chapter 6

# The Joint Venture Proposal

### 6.1 **Introduction**

6.1.1 On 9 July 1992 an application seeking consents pursuant to the Resource Management Act 1991 to exploit the Ngawha geothermal resource for the purpose of electricity generation was made by a joint venture comprising the Bay of Islands Electric Power Board and the Taitokerau Maori Trust Board.

Nga hapu o Ngawha have lodged submissions in opposition to the joint venture application with the local authorities and they allege, in their statement of claim to this tribunal, that any grant of resource consents to exploit the Ngawha geothermal resource will directly contravene their title to and rangatiratanga of the Ngawha geothermal resource, and will deny their right to act as kaitiaki of this taonga.

The claimants seek the following findings from us:

- that ownership of and rangatiratanga over the Ngawha geothermal resource is and remains vested in nga hapu o Ngawha; and
- that the grant of resource consents to the joint venture applicants would be in breach of those rights unless and until the consent of nga hapu o Ngawha is procured.

Originally it was envisaged that the Parahirahi C1 block trustees (more commonly referred to as the Waiariki trustees) would participate in the joint venture. As will be seen they withdrew from the joint venture and the Taitokerau Maori Trust Board continued with it.

6.1.2 Evidence concerning the joint venture proposal was called by the claimants, the Crown and the joint venture. Before considering the claims relating to the joint venture application for consents to exploit the Ngawha geothermal resource, it is necessary to review this evidence.

### 6.2 **Formation of the Joint Venture**

6.2.1 Sir Graham Latimer stated (B38:1-4) that early in 1991 Wiremu Tairua, then chairman of the Waiariki trust, invited Sir Graham, as Chairman of the Taitokerau Maori Trust Board and Taitokerau District Maori Council, to attend a meeting of the Waiariki trustees. The meeting was to discuss Maori participation in a proposed joint venture

*Ngawha Geothermal Resource*

with the Bay of Islands Electric Power Board to tap the Ngawha geothermal resource. Sir Graham was aware that there had already been preliminary discussions between Mr Tairua and the power board, represented by its chief executive officer, Roger de Bray.

In the result, Sir Graham attended two meetings at Mr Tairua's invitation, the first on 25 April 1991 and the second some time between 8 and 13 May 1991. Mr Tairua was present on both occasions, and Sir Graham named four other Waiariki trustees (including the present chairman, Kereama Rankin) who were present at either or both meetings. He also named two representatives of the Ngawha Maori committee who were present at both meetings.

Sir Graham understood that at these meetings the Waiariki trustees clearly assumed a mandate for the Ngawha people. He was satisfied that the trustees backed the concept of a joint venture geothermal development with the power board, and that the trustees' involvement reflected the appropriate level and extent of consultation. He also referred to two subsequent meetings, neither of which he attended: the first involving the power board and held at the Ngapuhi runanga offices and another held at the Ngawha Springs public hall.

On 13 May, after the second meeting, Mr Tairua wrote to Sir Graham:

After your departure it was decided by those present that a joint venture would be authorised.

Because you are a person of action and [have] no time to spare, too many trustees would be a hindrance and not a help.

The Task Force members from Ngawha can report to the trustees and the trustees can report to the people at large at a specially convened hui if required.

... The "*Ngawha geothermal task force*" should be comprised of six [personnel] only.

<i>Sir Graham Latimer</i>	<i>Chairman</i>
<i>Wiremu Tairua</i>	<i>Deputy chairman</i>
<i>Wiremu Puriri</i>	<i>Legal representative</i>
<i>Paddy Reihana</i>	<i>Task force</i>
<i>Hetaraka Aperahama</i>	<i>Task force</i>
<i>George A Ruka</i>	<i>Task force</i>

If this does not meet your criteria please telephone... (B38:8)

Of the Ngawha people proposed as members of the task force, it appears that only Mr Tairua was at the time a Waiariki trustee.

*Waitangi Tribunal Reports*

Mr Rankin told us (A54(q):3-4) that he was first advised of the joint venture proposal in about April of 1991 and was initially supportive of it. He emphasised, however, that the proposal was not put to the wider trustee body until July 1991 and that the trustees as a group never agreed to it.

As a result of the two meetings Sir Graham attended, steps were taken to join the Taitokerau Maori Trust Board with the Waiariki trust in the proposed joint venture with the power board. Sir Graham stated that there were further discussions which included the power board and that in due course a joint venture agreement was prepared which was circulated and discussed with the Waiariki representatives.

On or by 5 June 1991, the trust board and the Waiariki trust formed a company called Grenside Developments Ltd for the purposes of the joint venture. On that date a meeting of four of the company's directors, including Mr Tairua and Mr Rankin, resolved:

- that the company approve the transfer of half its shareholding (50 \$1 shares) to the trustees of the Parahirahi C1 trust (the Waiariki trust);
- to appoint Mr Tairua and Mr Rankin as directors; and
- that the company execute under seal the joint development agreement with the power board for the Ngawha geothermal project (B38:10).

On the same day, Grenside Developments Limited executed the joint venture agreement with the Bay of Islands Electric Power Board. Mr de Bray, who had taken on the additional role of project manager of the joint venture, stated that the joint venture company was formed with the power board holding 50% of the shares and the trust board and Waiariki trustees holding 25% each (B40:2).

Mr Tairua and Mr Rankin signed two other documents that day (B38:11-12). The first is a declaration that they hold 50 shares in Grenside Developments Limited as bare trustees for the beneficiaries of the Parahirahi C1 trust. The second document, which is expressed "to give effect to clause 9.2 of the joint venture agreement", assigns to Grenside Developments Limited "on behalf of the Parahirahi C1 trustees otherwise known as Waiaraiki [sic] Trust":

the Trust's entitlement to commercial rights present or future arising out of the Trust's claim brought before the Waitangi Tribunal for return by the Crown of interests in the Parahirahi Block. (B38:12)

At some later date the name of Grenside Developments Limited was changed to Taitokerau Ngawha Limited.

Mr Rankin stated that from July 1991 he became more and more troubled with the joint venture proposal. Eventually he withdrew his support, believing that his tupuna came to

### *Ngawha Geothermal Resource*

remind him who he was and to tell him that the taonga was too sacred to be desecrated in the way that was being proposed. At that time, he said, the Waiariki trustees indicated to the Taitokerau Maori Trust Board and to the Bay of Islands Electric Power Board that they were opposed to any exploitation of their taonga (A54(q):4).

He produced a copy of a letter, dated 27 August 1991, which he had written to Sir Graham Latimer as Chairman of the Taitokerau Maori Trust Board. Signed by all the Waiariki trustees except Mr Tairua, the letter refers to a 4 August meeting of the Waiariki trustees at which it was decided that they "should terminate the partnership". It then asks the trust board to join the Waiariki trustees "in the process of bowing out quietly without publicity". The letter refers to the signatories' lack of knowledge of any arrangement established between Mr Tairua and the trust board and maintains that the trustees had no part in it. The concluding paragraph of the letter seems to assume that the trust board would withdraw its support for the Ngawha development. It states that the power board should seek the proper planning consent and landowners' consent and "give us the opportunity to object via the proper channels" (A54(q):7).

Also produced by Mr Rankin was a response signed by Wiremu Puriri for the Secretary of the Taitokerau Maori Trust Board, dated 9 September 1991. It acknowledges the receipt of a copy of a letter similar in contents to the letter of 27 August above and of the same date, but sent to the power board. It informed Mr Rankin that the Taitokerau Maori Trust Board was committed to proceeding with the joint venture and that it would do so on behalf of its beneficiaries, which include the people of Ngawha (A54(q):8).

Sir Graham told us that the Taitokerau Maori Trust Board has at all times been fully supportive of the geothermal development initiative.<sup>1</sup> The eight members of the trust board, including two appointed to represent Ngapuhi, unanimously support the joint venture and it is Sir Graham's belief that they have reported to the people they represent in relation to the venture. He added that the Taitokerau District Maori Council also supported the trust board's involvement (B38:3).

Following the June 1991 formalisation of the joint venture, a joint venture committee had been appointed, the Maori representatives being Sir Graham and Mr Puriri for the trust board and Mr Tairua and Mr Rankin for the Waiariki trustees. Sir Graham said that Mr Rankin attended two meetings but did not attend thereafter. He also said that it became apparent to him towards the end of 1991, and more so in 1992, that Mr Rankin had second thoughts about the wisdom of the proposed development. Sir Graham referred to "ructions" within the Waiariki trust which resulted in Mr Rankin replacing Mr Tairua as chairman and said that thw s not only outside the tribunal's expertise but was directly within the jurisdiction of the local councils (and, on appeal, the Planning Tribunal) which would consider the joint venture's resource consent applications under the Resource Management Act 1991.

For these reasons, counsel objected to the degree of technicality of parts of the written evidence of Thomas Lumb, a witness for the claimants whose brief of evidence had

been made available prior to the hearing.

Counsel for the claimants agreed that the Waitangi Tribunal did not need to make any find the Waiariki trust, pursued the development project from July 1991 until February 1992, during which period considerable monies were committed to the evaluation of the project and the preparation of the resource consent application. In February 1992, the Waiariki trust notified the joint venture that it would no longer support the application but, although that notification expressed reservations as to the scientific evidence or, perhaps, the size of the development, the power board had never been given a reason to justify the Waiariki trust's change of position. Since February 1992, he stated, the remaining joint venture partners have pursued the resource application (B40:7-8; C12(c):11).

In response to questions from counsel for the claimants, Mr de Bray recalled the letter sent by Mr Rankin to the power board and signed by all the Waiariki trustees except Mr Tairua. He remembered that it talked of the power board possibly being left with a white elephant and of the cultural effects of development upon the springs. He could not remember the letter's date but intimated that the power board would not necessarily have understood it to spell the end of the joint venture because, as he explained, the power board dealt with its joint venture partner through Grenside Developments Limited, to whose directors it still sends circulars advising of the venture's progress (C12(c):3).

Some time subsequent to August 1991, the share capital of Taitokerau Ngawha Limited was increased to \$10,000 to meet its expenses. When the Waiariki trust declined to take up its share of the pro rata allocation, the Taitokerau Maori Trust Board increased its own share to something in the order of 95% (B38:4). Sir Graham Latimer stated that he believed Mr Tairua holds the remaining 5%.

### **6.3 Waitangi Tribunal's Jurisdiction Regarding the Proposed Development**

6.3.1 Counsel for the joint venture submitted at the very outset of the hearing of the claim that it was not for the Waitangi Tribunal to decide whether the proposed development would impact upon the springs. He argued that the technicality of the evidence that would be required to assess that matter was not only outside the tribunal's expertise but was directly within the jurisdiction of the local councils (and, on appeal, the Planning Tribunal) which would consider the joint venture's resource consent applications under the Resource Management Act 1991.

For these reasons, counsel objected to the degree of technicality of parts of the written evidence of Thomas Lumb, a witness for the claimants whose brief of evidence had been made available prior to the hearing.

Counsel for the claimants agreed that the Waitangi Tribunal did not need to make any findings about the joint venture proposal's impact upon the springs. However, in his submission, the tribunal needed to be aware of the context in which the claimants made

## *Ngawha Geothermal Resource*

their claim, including the joint venture's application for resource consents which was the reason urgency had been granted to the claim.

- 6.3.2 In the result, claimants' counsel conceded that the sections of Mr Lumb's written evidence which specifically discussed the possible environmental impact of a geothermal development such as that proposed by the joint venture, would be replaced by more general evidence as to the potential effects of any development of the Ngawha resource. In response to that evidence, the counsel for the joint venture called as witnesses Mr de Bray and Dr Arnold Watson, principal of KRTA Ltd, the firm of consulting engineers engaged by the joint venture to study the Ngawha geothermal resource and prepare its resource consent application. The Crown commissioned Dr Douglas Sheppard, a geochemist with the Institute of Geological and Nuclear Sciences Limited, to comment on Mr Lumb's evidence.

### 6.4 **The Joint Venture Proposal: Overview**

- 6.4.1 The evidence of Mr de Bray provided a general overview of the joint venture proposal. An engineer with commerce and management qualifications, he explained that the Ngawha joint venture was formed with the primary intention of developing the geothermal resource for electricity generation (B40:1). He considered secondary uses of the resource to promote local industry, such as the use of heat and the extraction of minerals, are also possibilities (C12(c):4-10).

The joint venture company's objective is to control and manage the resource in compliance with the Resource Management Act 1991. To achieve this, it expects to have to make payments to the Crown for use of the resource itself and for the use of existing Crown equipment and bores, and payments to landowners for access to the resource. The company would install pipeline equipment and maintain monitoring regimes as required by resource management consents.

The company's revenue would be derived from granting access to the geothermal fluid to users. Being 100% geared (funded by borrowed capital), he claimed the company's structure will allow participation in the use of the resource by local groups who might not otherwise have access to the large amount of capital required for its development (B40:2). The charges to users would return a dividend to the joint venture partners.

### *Waitangi Tribunal Reports*

From the outset, the joint venture company set clear guidelines in several areas:

- the project would proceed only if economically viable;
- any effect on the Ngawha hot springs must not be significant and must not exceed seasonal variations; and
- the project must be environmentally responsible without discharges of fluids.

Mr de Bray also stated that the scientific information available on the Ngawha geothermal resource is insufficient to predict the environmental effects of a large power development in the 25-100 megawatt output range. Because of this and the capital expenditure required for such a development, the joint venture company proposes to install a pilot plant of nominally eight megawatt generation capacity. Several of the existing wells in the area are individually capable of this output so may be used in turn to supply geothermal fluid. There are also a sufficient number of existing wells available for reinjection of the quantity of geothermal fluid required for the pilot development.

From the scientific evidence available, Mr de Bray said that the joint venture company has a very high level of confidence that the pilot development can be sustained by the resource without detriment to it or to the surrounding environment. In addition, because the pilot development will be essentially a means of large scale testing of the resource's capacity to sustain a long term and larger development, it will, after about two years of operation, disclose sufficient information about the resource to enable decisions to be made about a bigger development and its design.

The joint venture company's applications for resource consents have been made with a 24 megawatt development in mind. That size development would allow maximum use of the existing wells and is the largest which can be envisaged using the type of plant equipment that is proposed to be used. To allow a margin over the requirements of a 24 megawatt development, the resource consents applied for have been set at four times the eight megawatt requirement for the taking and discharge of geothermal fluid.

A list of the resource consents applied for by the joint venture company is contained in Part I of the four volume "Assessment of Environmental Effects" prepared by KRTA Limited in support of the applications (A43:3). Each consent applied for is for a period of 35 years. Amongst those sought are consents:

- to take up to 35,000 tonnes per day of geothermal fluid on a continuous basis;

### *Ngawha Geothermal Resource*

- to inject up to 35,000 tonnes per day of geothermal fluid, condensate and gas on a continuous basis;
- to discharge geothermal fluid and condensate to holding ponds for well testing, power plant startup and shutdown and other purposes, such discharges to be later reinjected to deep wells and the quantities to be limited by the above two applications;
- to discharge intermittently up to 1,500 tonnes per day of rainwater from holding ponds;
- to intermittently inject up to 4,400 tonnes per day of water or drilling fluid during the course of drilling, working over or testing geothermal wells;
- to intermittently take up to 3,000 tonnes per day of water from the Ngawha stream for drilling purposes, subject to leaving a minimum residual flow;
- to intermittently discharge up to 650 tonnes per day of drilling waste to holding ponds;
- to discharge to the Ngawha and Waiparera streams up to 650 tonnes per day of treated drilling waste water which complies with receiving water standards;
- to discharge gas and water vapour into the atmosphere for short periods during testing and continuously from the pilot plant, subject to noise restrictions and the permissible limits for concentration of noxious gases;
- to install well testing equipment and pilot power plant;
- to construct and use holding ponds;
- to construct roads and pipelines and, where appropriate or required, bunding along pipeline routes and pumping stations;
- to construct electrical transmission lines;
- to construct permanent and temporary chemical storage facilities; and
- to dispose of, by burial, solid wastes consisting of well workover debris, mud and cuttings for any future drilling and such minor quantities of power station sludge as may occur.

## **6.5 Scientific Evidence**

### ***Claimants' evidence***

6.5.1 As noted in chapter 4 (4.2.1) Mr Lumb is an energy resource consultant concentrating on geothermal energy. His evidence for the claimants, so far as is relevant here, focused on the potential impact of any development of the Ngawha geothermal field upon the Ngawha springs, the geothermal reservoir and the external environment. Relying on a study conducted by Dr Mark McGuinness, a Senior Lecturer in Mathematics at Victoria University of Wellington, Mr Lumb summarised some of the potential effects as follows:

3.1 *Impact on the Ngawha Springs*

...

(a) *Effects due to temperature changes:*

Temperature changes will produce the largest effects. They will be centred on reinjection wells and will consist of the cooling of a roughly circular region around the well. As more water is reinjected the region will grow at a rate that is dependent upon the quantity of fluid that is reinjected. The effect that this cooling would have on the springs themselves would depend on the distance of the injection well from the springs. If it were such that the cooled area reached the part of the field that feeds the springs then they will be affected. The cooling is likely to turn off the source of steam and gas that presently heats and drives the springs. There is clear evidence of two-phase (i.e steam and liquid water together in equilibrium) regions presently under the caprock and these are believed to be critical to the continuation of the hot springs at the ground surface. If cooling to this extent occurred, complete recovery would not be expected for a long time and would depend on the natural regional flow across the exploited part of the field. A rough calculation suggests that it would take over 150 years for a cooled region 500m across to be replenished by the regional flow used by Dr McGuinness in his calculations.

(b) *Effects due to pressure changes*

As noted above, the region of the reservoir in which production is most likely to take place has a high permeability. Because of this changes in pressure will be transmitted quite readily throughout this region and they will not become concentrated around the production and injection wells. Overall pressure changes would be due to the net removal of fluid from the reservoir and, because it is expected that most fluid would be reinjected, this would be quite small. If the non-condensable gases (mainly carbon dioxide) are not reinjected a 1% loss of fluid would result which Dr McGuinness concludes would have a negligible impact, even for a 300-400 kg/s development.

## *Ngawha Geothermal Resource*

### *3.2 Impact on the reservoir as a whole*

The remarks above apply also to the broader reservoir. Pressure impact will be small, and temperature impact will be in regions that grow from the injection wells. There will be marked local effects around the injection wells, modified by the effect of a regional movement of fluid across the reservoir.

### *3.3 Possible impacts on the external environment*

As it is assumed that any development will involve the reinjection of virtually all geothermal fluid, there would be no expected external impact on any part of the environment, except that resulting from the possible discharge of non-condensable gases into the atmosphere. (A51(e):2-3)

The next section of Mr Lumb's evidence dealt with the possible impacts of an accident or operational failure during which geothermal fluid could well enter the environment. Dismissing the argument that such events are "unlikely" to happen, he maintained that they do happen and, indeed, that in the absence of specific controls imposed on the release of "dangerous" geothermal components during drilling, testing, plant shutup or shutdown, similar problems can occur during particular times of otherwise normal operation (A51(a):14-19).

Acknowledging limitations of time, facilities and personal expertise, Mr Lumb's brief overview of the environmental and health and safety effects of a "worst case" accident or spillage drew mainly on the studies carried out during investigations of the early 1980s. He stated:

The principal risks following a major accident or spillage will come from the chemicals or the heat in the geothermal fluid. The most important chemical constituents of environmental concern at Ngawha are mercury and boron, both being present in much higher concentrations here than in other geothermal fields (both up to 50 times the concentration at Wairakei). (A51(a):16)

After mentioning the well-known effects of mercury poisoning, Mr Lumb gave closer attention to the effects of water being contaminated by boron, noting that information available does not address the question of how long an organism must be exposed to high levels of the toxic element before an effect is noted or becomes serious.

Mr Lumb also pointed out that there may be risks even if no development takes place: small, if the reinjection wells are far enough from the springs, and the effect may take many years to become manifest, but it is not possible to say that there will be no effect. It is quite clear that effective protection of the Ngawha Springs will depend critically upon the appropriate management of the deep reservoir.

(A51(b):4)

***Joint venture's evidence***

- 6.5.2 As earlier indicated (4.3.4), Dr Watson gave evidence on behalf of the joint venture. He was employed to lead a team studying the Ngawha geothermal resource and preparing the resource consent application to the Far North District Council and Northland Regional Council.

Commenting on Mr Lumb's assessment of the potential effects of development on the Ngawha geothermal resource, Dr Watson stated that the level of the proposed development was chosen for having a negligible impact on the resource, that is, an impact that will be sustainable in the long term. He accepted Dr McGuinness's results, reported by Mr Lumb, that changes in pressure due to both the proposed pilot and maximum developments will be negligible ded, with respect to Ngawha:

Any development involving other than the natural surface flow will have some effect on the surface springs. The effect may be small, if the reinjection wells are far enough from the springs, and the effect may take many years to become manifest, but it is not possible to say that there will be *no* effect. It is quite clear that effective protection of the Ngawha Springs will depend critically upon the appropriate management of the deep reservoir. (A51(b):4)

***Joint venture's evidence***

- 6.5.3 As earlier indicated (4.3.4), Dr Watson gave evidence on behalf of the joint venture. He was employed to lead a team studying the Ngawha geothermal resource and preparing the resource consent application to the Far North District Council and Northland Regional Council.

Commenting on Mr Lumb's assessment of the potential effects of development on the Ngawha geothermal resource, Dr Watson stated that the level of the proposed development was chosen for having a negligible impact on the resource, that is, an impact that will be sustainable in the long term. He accepted Dr McGuinness's results, reported by Mr Lumb, that changes in pressure due to both the proposed pilot and maximum developments will be negligible as will be the effect due to discharging the gas to the atmosphere rather than reinjecting it.

Dr Watson also accepted, as a best estimate at the moment, the results of Dr McGuinness's calculations about local temperature reduction around the reinjection wells. He pointed out that, scientifically speaking, Dr McGuinness's estimates in this regard were crude, being based on assumptions rather than actual information about the subsurface flows. In response to questions from counsel for the claimants, Dr Watson elaborated that it was for the very reason that information about the subsurface flows was so limited that a pilot scheme was proposed. He stated that what was predicted would not be allowed to eventuate because the pilot scheme would monitor and prevent

## *Ngawha Geothermal Resource*

damage to the springs (B39:10; C12(d):7).

With regard to impacts on the external environment, Dr Watson referred to Mr Lumb's earlier quoted conclusion that, except for the possible discharge into the atmosphere of non-condensable gases, there would be no expected external impact on any part of the environment. He pointed out that the Resource Management Act requires that environmental (and other) issues be considered in detail and that the joint venture's "Assessment of Environmental Effects", a public document, dealt with these comprehensively (B39:10-11).

On the matter of accidental damage, Dr Watson referred to the same document's detailed treatment of the effects of a spillage of geothermal fluid. Contingency plans and steps that can be taken in design and construction to minimise those effects were discussed in the "Effects" document but more attention would be given to those matters at the time of detailed design. He also pointed out that there are no contingency plans in place at present to deal with the effects of possible wellhead failure, a risk which has existed since the wells were drilled between 1977 and 1983 (B39:11).

As to effects on the springs themselves, Dr Watson stated that they are important to local people and need to be protected, and that preservation of the springs has been a major factor in planning the development. However, he added that there is a need to place them in perspective and take a balanced view in assessing their importance. In particular, he thought some people might overrate the springs' value as a tourist attraction which, in his own view "is small compared to others in New Zealand, and is insignificant in world terms" (B39:12).

Dr Watson explained that it is because the springs are a local feature of importance, are important to Maori, are said to have medicinal qualities and have been used by local people historically and recently, that the development had been planned with their protection in mind. That protection extended to the eventual size of the development, the pilot stage and the use of the well Ng 13, which reportedly has the greatest effect on the springs. That well would be tested last in the development programme, Dr Watson stated, by which time it should be able to be predicted how it might affect the springs. If it proved necessary, Ng 13 would be used sparingly (B39:12).

Responding to Dr McGuinness's opinion that the springs could be affected if cold reinjected fluid reaches the two-phase region of the resource which feeds them, and especially to Mr Lumb's conclusion that it is not possible to say there will be no effect on the springs from development, Dr Watson maintained that their opinions failed to acknowledge present variations in the springs and to address the issues of what amounted to an "acceptable" effect on them and whether the joint venture was capable of managing the resource within such constraints (B39:12-13).

Dr Watson defined an acceptable effect on the springs as one that is much smaller than the natural short term variation due to the weather. He stated:

If this effect takes place, it will be undetectable by bath users, but detectable by instruments. In practice it will be difficult to separate out the natural variations from those due to the development, and a considerable amount of scientific effort will be involved. It will be necessary to correlate measurements on the springs with measurements of well discharge rate, temperature and probably chemistry. This has been anticipated, although detailed plans have not yet been formulated. The use of the wells in the pilot scheme has been planned to produce the least effect first, by using wells farthest from the springs first, and then Ng 13 for reinjection before discharge. (B39:13)

In response to questions from claimants' counsel, Dr Watson elaborated that the planned use of Ng 13 was for testing only and that although it was not necessary to use it in the pilot scheme, it was important to test it to see what effects were produced. He explained that the joint venture was well aware of the potential for Ng 13 to affect the springs, because of the fact that the bottom of that well was only 200 metres from the springs, and that the proposed test use of Ng 13, which would be monitored, aimed to produce a small measurable effect on the springs so that more could be learned about how to use the resource and preserve the springs (C12(d):10-11).

Dr Watson concluded:

I accept that there will be some effect on the springs, but believe that it will be much smaller than the natural variations. The Joint Venture have taken steps to make this well known to local people, through the press, open days and the Effects Statement. I know of no way to estimate the effect by calculation, although the physical mechanisms by which the effects will be produced have been identified. I believe that the effects can be held to acceptable limits, at least for the pilot development and probably for the maximum planned development by following the planned development programme. (B39:13)

***Crown evidence***

- 6.5.4 The Crown commissioned the Institute of Geological and Nuclear Sciences to comment on Mr Lumb's submission to the tribunal. We have earlier referred to certain evidence of Dr Sheppard, who prepared the commentary.

At the outset of his evidence Dr Sheppard stated that he considered Mr Lumb's statement covered the issues well, and that he wished to place a different emphasis to complement, elaborate and clarify some of Mr Lumb's points and issues raised by others who had been heard by the tribunal (B37:1).

Of relevance for present purposes is the fact that between 1980 and 1983 Dr Sheppard conducted a monitoring programme on the springs at Ngawha, including Omapere Soda Spring, the Lakes Waiparaheka and Ngamokaikai, and the drainages, measuring temperatures, water and gas chemical composition, and flows. Focusing particularly on the impact on the environment of human activity over the last century, Dr Sheppard

## *Ngawha Geothermal Resource*

concluded at that time:

A survey of the available scientific literature describing the Ngawha thermal features and comparison with those features today shows that, as far as can be judged, the location of the features has changed little, but that the features themselves have been modified by bath excavation, and mining operations earlier this century. The hottest features have been modified, or are controlled, by flooding with cold water in order that they might be used as baths.

The chemical composition of the bath waters reflects a hydrological balance between the two supply waters - one a shallow extensive high magnesium-bicarbonate water, the other the high chloride-boron water derived from the deep geothermal fluids. The compositions of the baths is influenced by various management practices on the baths, by the rainfall of the preceding few days, and by surface drainage.

The gases are similar in composition to the gases from the deep geothermal wells. An interesting variation in helium content of the gases, apparently related to the discharge from a deep well, was observed and confirmed. No other consequence of these discharges was observed in the springs, but given the small total discharge of the tests and the relative impermeability of the cap of the system this is not altogether surprising.

The analyses presented... serve primarily as an indication of the natural variability of the springs, baths and wells examined. (B37:7-8)

Dr Sheppard had recommended as a result of his study that any future programme should closely monitor three specific aspects of thermal features in the area so that long term changes distinguishable from the natural variability might be detected. He had added at the time:

It is to be expected that sustained, large volume discharge will have a dramatic effect on the present surface manifestations of the field, but at Ngawha this may be delayed, and be of quite a different character to the reduction in liquid output, and change in character experienced in other fields e.g. Wairakei, Larderello (Italy), Ohaaki. The difference is to be expected because of the presence of large amounts of gas, both dissolved and in vapour/steam pockets, and the impermeability of the deep capping rock formation. (B37:8)

In his evidence to the tribunal, Dr Sheppard stated that none of the recommendations arising from his 1980-1983 study had been implemented and that he had no reason to modify his earlier conclusions. He continued:

Because it is apparent that the flow of water *and gas* through the caprock is important in the supply of material and heat to the surface springs, as well as to the intermediate water body (or bodies), it is important that attempts to predict the responses of the system take this into account. In this regard, it is

*Waitangi Tribunal Reports*

conceivable that the reinjection of all of the extracted mass of material into the reservoir as a part of any development may not ensure that there are no noticeable effects at the surface. (B37:8-9)

After giving his opinion that the mobility of two-phase mixtures in confining media, such as narrow cracks and channels in rocks, would seem to be very susceptible to pressure changes, as predicted by Dr McGuinness's calculations (B37:9), Dr Sheppard said:

The estimation of significance of effects produced by new exploitations of the system is a difficult matter, and it may well be that there is a level of exploitation of the deep reservoir which will have insignificant effects on the surface phenomena. I don't know what this level is, and do not have the means to determine it. It would seem that a cautious approach should be taken if the desire is to protect the taonga claimed by the hapu. We must, however, also realise that changes may take some time to manifest themselves, and that because of the nature of the system, remedial management measures may not be effective at least in the short term. (B37:9)

Of further relevance in the present context are the concluding paragraphs of Dr Sheppard's evidence:

The monitoring programme which I conducted showed up no changes in the springs and pools which were clearly attributable to the discharge of the wells during the period. I am aware that statements have been made by pool owners and managers that they noted such effects. Since my sampling was on a monthly basis with some sampling at closer intervals, I could well have missed some of these incidents. The management of the temperature of the pools by pumping of water out of and into them could well mask these effects. The features which I monitored which were not managed in this way did not show any effects which I could attribute to the well testing programme. The variability in the springs and pools which was observed was considered to be due to factors such as rainfall (or the lack of it), air temperature, or even natural variability in the springs themselves, which must be expected.

The excavation of spring sites for the creation of pools for bathing, and the pumping of the waters, constitutes [what] should be considered as a significant exploitation of the system which results in a modification of the surface features of the system, which is not capable of being rectified to the original state. (B37:10)

***Claimant, joint venture and Crown reactions to the scientific evidence***

6.5.5 (a) Claimants

From the kaumatua evidence given to the tribunal in the first week of hearing, it was plain that the claimants were deeply concerned about the potential for physical damage being caused to the Ngawha springs by the joint venture development. It was also plain that their concern extended beyond physical effects upon the springs to other interferences which they believed were threatened by the joint venture's proposal. As was recorded in chapter 2, kaumatua spoke of the desecration of their taonga by interferences with its heart or spiritual source.

The inability of scientific evidence to allay the claimants' concerns about the physical and metaphysical effects upon the springs is revealed by kaumatua Ronald Wihongi's response to questions from Crown counsel as to the reasons for the claimants' opposition to the joint venture proposal. Having agreed with counsel that he was concerned that all the proper minerals remain in the pools and that the pools retain their several temperatures, Mr Wihongi stated that the claimants would not agree to the development proposal even if the mineral content and temperatures of the pools could be protected. Explaining why this was so, he stated:

I will say this, I stand in place of my ancestors, and anything that happens to desecrate those pools I will not agree to, as they would not have agreed to in their day. Because this resource was given to us by God so therefore I will never agree to have them desecrated by anyone.

...

I know if there was drilling done, underground and above, it must affect the source of supply of the spring. (B36:II:10; A54(a))

Crown counsel's next question was:

If it does not affect the source of supply of that spring, is that a desecration?

Mr Wihongi responded:

To me, that question is not relevant, or correct. (B36:II:10; A54(a))

(b) Joint Venture

There was some discrepancy in the reactions of the joint venture partners to the scientific evidence of the possible impact of the proposed development upon the springs. Mr de Bray, for the power board, stated that the joint venture intended to proceed without commissioning any further scientific evidence, adding that the Resource Management Act will almost inevitably lead the local council to take

*Waitangi Tribunal Reports*

independent scientific advice as part of its review of the proposal's content (C12(c):13).

Sir Graham Latimer and Professor Hohepa for the trust board, expressed reservations about their satisfaction with the scientific evidence. In his written evidence Sir Graham stated:

It was agreed by all parties from the start that the proposal would only proceed to actual development if we were satisfied that there would not be an adverse effect on the Springs. Appropriate scientific and other studies that have been undertaken to this point indicate that there will be no adverse effect. (B38:5)

In response to questions from claimants' counsel, however, Sir Graham said that while he felt comfortable with the feasibility study that had been done, he would like it to be counter-checked, and if it was found that there were any effects on the springs, the Taitokerau Maori Trust Board would withdraw from the joint venture. He elaborated that he was not concerned only with environmental or physical effects, because the healing and spiritual aspects of the pools were just as important.

Counsel for the claimants then asked for Sir Graham's reaction to the kaumatua view that the healing powers (or mauri) of the pools would be detrimentally affected by development. Sir Graham replied that he would want scientific evidence before he was satisfied that there would be an effect and that, without meaning disrespect, he too was a kaumatua and had his own opinion.

Professor Hohepa, who was commissioned by the tribunal to give expert evidence but who is also a member of the Taitokerau Maori Trust Board, elaborated orally on his written evidence, adding comments about the acceptability of the scientific evidence before the joint venture partners. He stated that one scientist had shown that one bore had effects on the springs and that there was a need for more scientific data. In his view, the days of using resources because they are there have gone and the joint venture had to be certain about the effects the proposal could have. He acknowledged that a lot of kaumatua and kuia had expressed concern about the proposal and that he had to reflect their concern. He added that this would be the first time there had been a significant shift in the use of geothermal energy in Northland and expressed his desire to "get it right the first time". He concluded this part of his evidence by stating that he thought the joint venture needed more time for scientific evidence before the proposal was furthered. He stated that the trust board would ensure there had been full and adequate scientific evidence because there are too many things that can go wrong.

In his closing submissions counsel for the joint venture, after referring to the Waitangi Tribunal's emphasis upon partnership in the use of resources, stated:

The joint venture represents such a partnership and fundamental to its approach to the use of the resource is the preservation of the integrity of the

### *Ngawha Geothermal Resource*

pools. That was established as a principal criteria of use in the first discussions held between the Power Board and the Waiariki Trustees (see the evidence of Sir Graham Latimer) and was endorsed when the Tai Tokerau Maori Trust Board became involved. Mr Rankin notes that "The Chairman was very conclusive in his, the way he spoke. He said that if anything should go wrong with the Springs we would stop altogether."

It is clear from the evidence of Mr de Bray and Dr Watson that the proposal for the use of the field has been designed to be very sensitive to the ongoing integrity of the pools. (C15:6)

Counsel added at that point that the joint venture proposal would ensure that nothing went wrong with the pools. In response to a question from the tribunal about the comments made by Sir Graham Latimer and Professor Hohepa, expressing a desire for further scientific evidence before the proposal proceeded, counsel acknowledged that those members of the Taitokerau Maori Trust Board did seem to want further assurances. He said that the concerns of the trust board were Maori concerns but it seemed to him, as counsel, that the guarantees given were as good as could be given. He stated that he was not aware of any development proposal which is so strongly supportive of the particular resource.

(c) The Crown

The Crown did not comment upon the scientific evidence. Its view of the claimants' concerns in this respect was subsumed within its argument that the Resource Management Act 1991 made ample provision for sustainability of the geothermal resource and the protection of the claimants' interests (C16:81-83).

#### **References**

1. In response to questions from counsel for the claimants, Sir Graham explained that in 1974 the Taitokerau District Maori Council had voted against developing the Ngawha geothermal resource and that the present trust board had to rescind that motion in order to approve the proposed development.