

CHAPTER 9

THE OXIDATION PONDS

9.1 INTRODUCTION

9.1.1 Initial information

The need for oxidation ponds was included in the provision of services outlined for the new Turangi township by the Ministry of Works engineer, John Bennion, at the meeting of owners at Tokaanu on 24 May 1964. He explained that the effluent would be irrigated over land to avoid polluting the lake, and that the area required for the ponds would be about 50 acres (A7:81). There was no other discussion recorded at this meeting about sewer lines, sewage treatment, or the specific land area required.

9.1.2 Awamate Road site chosen

In May 1964, no firm decisions had been made about sewage treatment facilities (A7:189–191). No specific site was identified, but it was intended that the oxidation ponds should be west of the new township. By 21 May, a layout proposal produced by the Ministry of Works' head office appears to have settled on the present site near Awamate Road. Possible sites further west were considered too swampy and likely to conflict with the as yet undecided route of the tailrace from the Tokaanu Power Station. A main sewer line would cross the intervening land from the township at a point just west of Hirangi Marae (fig 29). The ponds themselves would take up 28 acres, while the surrounding irrigation land would comprise 55 acres. It was envisaged that this latter area should be grazed, although it was not thought absolutely necessary that it should be owned by the Crown (B6(a):2). However, Gibson favoured the Crown acquiring the full 83 acres because 'the installation is to be a permanent one' (B6(a):5).

9.1.3 Public concern

At the 20 September owners' meeting at Tokaanu, Gibson responded to a question from Fearon Grace, who was concerned about 'chemicals . . . seeping through the swamp' and the impact of four to six floods a year from the Tongariro River, by assuming that it would be 'very many years' before the concentration of chemicals became 'injurious'. He explained that the chemicals would be 'converted into vegetable growth' and that, should an occasional flood pass over the swamp, 'it will be a surface flow and the chemicals will be dropped back down' (A7:77). In response to a question as to why the ponds were to be located so near to Awamate Road, Gibson explained that the site had been chosen bec

The Oxidation Ponds

of the 'fall of the land'; the effluent could flow with gravity rather than needing to be pumped, which would have had 'a material effect on the rates that people would have to pay' (A7:78). The costs of pumping day and night at 'several hundred pounds a year' would also preclude the 'too low-lying' Tokaanu village from being linked to the scheme (A7:78).

When the meeting was reconvened at Hirangi Marae that afternoon, there was further discussion of sewage disposal, and the use of oxidation ponds as a method of treatment was described as 'one of the biggest advances made' in recent years. Gibson explained how the oxidation pond and irrigation system would work, and gave an assurance that Lake Taupo would 'be protected from enrichment for several thousands of years' (A7:78).

The ponds would occupy an area of 58 acres but no specific figures were provided for the area required for the effluent outfall or for a buffer zone around the ponds. Gibson said that the Ministry of Works would consider any propositions to buy the buffer zone to guarantee its permanent existence. He also conceded that 'people who now farm along the oxidation pond area will experience some upset' (A7:78).

The area to be taken for the oxidation ponds was specifically defined in Part II of the Second Schedule to the Turangi Township Act 1964. Any additional area which might be purchased in the buffer zone would be subject to separate negotiations. However, this was not yet spelled out in legislation, although an area corresponding to the Second Schedule boundaries was clearly shown on the October 1964 plan for the Turangi township. Presumably it was also clear on the plan shown to local people at Hirangi Marae on 20 September.

In early December 1964, the mayor of Taupo was reported in the press as being concerned about the pollution of Lake Taupo by the proposed Turangi sewage treatment facilities. His remarks had been sparked by a comment by the Ministry of Works' chief public health engineer that no assurance could be given 'that "there will be no pollution whatsoever" of the lake' (B6(a):9). The mayor had accused the Ministry of Works engineers of being 'arrogantly bureaucratic'. The chief designing engineer responded that 'a great deal of engineering planning is being applied to all aspects of development' in Turangi, and quipped 'I wonder where the Taupo sewage goes now? People who live in glass houses shouldn't throw stones' (B6(a):11). In answer to an urgent question in Parliament, the Minister of Works, Percy Allen, stated that:

the proposed scheme for sewage disposal will ensure the minimum interference with national assets by avoiding the unnecessary artificial enrichment of Lake Taupo and the development of weed nuisance as at Lake Rotorua. (B6(a):12)

9.2 INITIAL CONSTRUCTION

9.2.1 Concern at the site of the oxidation ponds

The construction of the oxidation ponds and main sewer line began in February 1965, and in May of that year the first pond was commissioned. Bill Duff explained to the Tribunal how his father, Haukino Duff, tried to prevent Tokaanu B1J being entered for the excavation of the oxidation ponds:

When the decision was made for the oxidation ponds to go on that paddock, I remember my father objected strenuously. His opposition was strengthened by the fact that there was a tapu tree in that paddock which we called a kuiki tree. That particular tree was the place where our tipuna Marotoa was struck [by lightning and died]. My father continually went down there and put padlocks on the gate to prevent the Ministry of Works people from getting into the paddock. (A16:3)

At a meeting of owners held at Hirangi Marae on 3 March 1968, an unidentified owner complained he had not yet received any compensation for a section of the land where he used to live which was used for the oxidation ponds. He said the Works employees had once tried to prevent him from entering his land, but that he had driven through the gates regardless (B10(c): doc 21).

Two Maori households, the Church and Rota families, were forced to leave their homes, gardens, and orchards and go to live in the Turangi township. The impact of the eviction on these families is related in chapter 12.

For compensation purposes, the date of entry on the oxidation ponds was set at 10 February 1965. Excavated material was spread over Tokaanu B1L2A and B1L2B to the north of the area defined in the Second Schedule to the Turangi Township Act

1964. For reasons that are not explained in Ministry of Works files, the lands occupied (some 78 acres) were not taken by proclamation until April 1968 (B6(a):44). No compensation negotiations could be undertaken by the Maori Trustee until a proclamation taking the land was issued.

9.2.2 Compensation negotiations

In August 1968, the Maori Trustee initiated negotiations on compensation. It was not until early 1970 that all the valuations were completed, and, in August 1970, a formal compensation claim for lands taken as oxidation ponds was lodged by the trustee. The additional complicating factors in the negotiations were the lessee interests for the Church farm; that the sole owner of one of the blocks which had been taken had died, and this was later added to the Maori Trustee's responsibility by the executors of the estate; that there were severance issues and injurious affection on adjacent residual lands; that there were arguments over valuation fees, and whether an unformed Maori roadway should be compensated; and, finally, that there was the issue of compensation for the two dispossessed families. It transpired that the Church family did not actually own the dwelling in which they had been living. Legally, the Maori Trustee was required to distribute compensation payments for the house to all the owners of the block. In June 1971, some advance payments were made by the Ministry of Works, but final settlement was not made until March 1972 (B10(c): docs 28–29). It was over seven years after the date of entry.

The main sewer line, which affected several blocks, was completed in early 1965, and in September of that year the district officer of the Department of Maori Affairs was advised that, although no lands had been taken for the sewer, compensation would be payable under the Public Works Act 1928. In July 1966, the district officer, J E Cater, sought information on the status of the lands affected on behalf of the Maori Trustee, and was advised by the district chief land purchase officer that, since the Ministry of Works' land requirements in this area remained uncertain, any claims for injurious affection should be deferred in the meantime and the statutory time limit for making claims would be correspondingly extended to run from the date final land requirements were known (B10(c): doc 24).

In August 1966, Cater commissioned valuations on the blocks affected, based on their condition prior to the laying of the sewer mains (B10(c): doc 24). In subsequent correspondence, the Ministry of Works added that it would not be possible to build over any sewer line. In August 1968, the Maori Trustee lodged a claim for \$438.10 for injurious affection on the blocks in multiple ownership: Waipapa 1D2B3B and 1F3B2B3B and Tokaanu B1H. Early in 1969, the Taupo County Council indicated that

it may require an easement over land occupied by the sewer line, but this was not proceeded with (B10(c): doc 24; B10(d)). A sum of \$450, including interest, was finally agreed on in June 1969 and was paid to the Maori Trustee in March 1970.

9.2.3 Construction inspected

In September 1965, a party of Ministry of Works head office engineers inspected the water supply and sewage disposal facilities and wrote a letter afterwards to the project engineer, for the attention of John Bennion, congratulating Gibson and his staff 'on the standard of execution of these works'. They were confident that 'the Department's record in this matter should be such as to withstand any criticism both in respect of conception of the scheme and its very creditable execution' (B6(a):26).

While the engineering construction may have been well executed, the site's physical characteristics created difficulties in the disposing of effluent from the ponds. In April 1966, Bennion reported to the chief public health engineer at the Ministry's head office that the irrigation trenches in the first half of the area developed tended to hold water for a considerable period in wet weather, and thus did not serve their functions of disposing of the effluent by soakage and avoiding discharge to the lake (B6(a):28–29).

The chief public health engineer replied that, if complete disposal by soakage in trenches proved impossible, 'irrigation over pasture is very beneficial and had been considered in lieu of trench irrigation'. He felt there would be 'no real harm in allowing the overflow to flow over pasture into the swamp' (B6(a):30). He also suggested that a decision could be delayed until after the winter but, if necessary, surplus effluent could be diverted to the additional disposal area now available and allowed to flow over the surface and eventually soak in.

In 1968, probably in preparation for the handing over of the sewage treatment facilities to the Taupo County Council, a report was prepared by the treatment plant operator which indicated that the ponds were working as designed. However, problems in the disposal field were identified, and these were the result of inadequacies in both design and management. The entire length of the ditches (29 km) had to be cleared of weeds, but their layout meant that the spraying had to be done by hand rather than from a vehicle. Furthermore, the narrowness of some of the ditches had led to the deaths of 'many' sheep, which had entered them to graze the overhanging growth. A horse and a cow had also died when ditch sides had given way under their weight. Some ditches at the marshy lower end of the irrigation area showed poor permeability but, overall, 'the field has stood up well to the effluent disposed on it and assiduous search has revealed no point where any has escaped to the lake' (B6(a):34).

In September 1968, in response to a request from the Minister of Works, the Commissioner of Works reported that the Turangi sewage treatment facilities had

been 'singularly free of trouble' and that Gibson had assured him that there had been no evidence of any pollution or overflow from the irrigation area into the adjacent swamp or into the lake. He said that the only danger of sewage reaching the lake would come from the inundation of the ponds in a severe flood, but that the construction of a protective stopbank would prevent this (B6(a):38). There was no hint in this report of any problems with the irrigation ditches in the disposal field. It seems to have been assumed by the Ministry of Works that if no effluent was seen to be flowing directly into Lake Taupo then all was well. Efforts now only needed to be concentrated on preventing a flood from the Tongariro River engulfing the oxidation ponds.

9.2.4 Flood control stopbank constructed

By the middle of 1967, the Waikato Valley Authority had developed a flood control scheme for the lower Tongariro River which included a stopbank from a point on Waipapa 1D2B3B, near the confluence of the Hirangi Stream, all the way to Lake Taupo. The Ministry of Works was principally concerned with protecting the oxidation ponds from flood waters and was not prepared to construct the whole of this proposed stopbank. In July 1967, the resident engineer reported on two possible methods of flood protection: the construction of a perimeter dyke around the ponds or as much of the stopbank proposal as was necessary to protect the ponds. On 20 July, Gibson recommended to both the Commissioner of Works and the Waikato Valley Authority the 'construction of about one mile of the WVA stopbank' (B6(a):91). Initially, the authority was not prepared to authorise the construction but, by December 1967, consent had been granted (B6(a):102). On 11 April 1968, the Taupo County Council wrote to Gibson advising 'that the flood protection of the oxidation ponds is a necessary requirement in the Turangi take-over' and asking for 'a suitable clause to this effect in the agreement' (B6(a):104).

On 30 August 1968, a letter was sent to the Maori Trustee, with copies to the Tuwharetoa Maori Trust Board and selected owners, giving notice of proposed entry to several blocks along Awamate Road. The letter explained that the stopbank, when complete, would be 'grassed and suitable for stock to graze off, although no tilling of the land on the bank will be permitted'. The stopbank would not encroach on farmland 'any more than will be necessary' and 'Every care will be taken to disturb as little as possible the area affected' (B6(a):109). In September 1969, the stopbank was completed.

9.3 COMPENSATION SOUGHT FOR LAND AFFECTED BY STOPBANK

9.3.1 Claim lodged

On 21 October 1970, the Maori Trustee lodged a claim for \$240 with the Ministry of Works for injurious affection on the four blocks affected by the stopbank: Waipapa 1D2B3B and Tokaanu B1H, B1L2A, and B1L2B (B6(a):113). The district land purchase

officer of the Ministry of Works responded on 16 December, seeking details of the grounds for this claim. He argued that he could not see what 'permanent damage' to the land had resulted from the stopbank construction, and added that it had in fact protected the lands from flooding (B6(a):114).

On 12 January 1971, the Maori Trustee cited as grounds for the claim the loss of grazing during stopbank construction; the poorer soil on the banks; the dumping of pine trees on Tokaanu B1L2B; and the lessening of the value of Tokaanu B1H through the collection of water in the area adjacent to the stopbank (B6(a):115).

9.3.2 Purchase of stopbank land initiated

The Ministry of Works decided that, because of the 'importance' of the work, the Crown should have some interest in the land occupied by the stopbank, and advised the district officer of the Department of Maori Affairs accordingly. There were further discussions with the Waikato Valley Authority, which advised the Ministry in June 1971 that the stopbank site should be purchased. By October, the Ministry was considering the alternative of obtaining an easement, which would avoid the objections of Maori owners to the taking of the freehold and overcome the problems of severance of parts of the blocks concerned if a strip for the stopbank were taken.

The matter was left unresolved until 1973, when the Waikato Valley Authority held a meeting with some of the Maori owners. However, there was no further communication with the authority, as Eileen Duff explained in a letter to the Town and Country Planning Appeal Board on 13 October 1980:

In 1973 my family met representatives from the Waikato Valley Authority. At that meeting we all stated that the above land was to remain ours; we did not want to sell or receive compensation. However we all agreed that the Authority could build a stopbank and have access to the waterways. My family nominated me to liaise with the Authority but to date I have not heard from the Waikato Valley Authority. The schedule notice . . . in our local paper is the only communication we have had. (B6(a):130-131)

On 19 September 1980, the Waikato Valley Authority had issued a notice of intention 'under the provisions of the Public Works Act 1928, to take an easement for soil conservation and river control purposes' over Waipapa 1D2B3B and Tokaanu B1H (B10(c): doc 31). By this time, the other two blocks affected by the stopbank, Tokaanu

The Oxidation Ponds

B1L2A and B1L2B, had become Crown land as part of the Tokaanu swamp lands exchange in 1970.

Meanwhile, the Maori Land Court had, in November 1976, appointed four owners as agents under section 73 of the Maori Affairs Amendment Act 1974 to negotiate on the stopbank and other matters on Waipapa 1D2B3B and Tokaanu B1H. The Maori Trustee had written to the Maori owners in 1975 and instigated the applications to the court. By this time, the trustee had lost the statutory authority to act, with the passing of the Maori Purposes Act 1974, which repealed this provision of the Public Works Amendment Act 1962. However, the Maori Trust Office in Wanganui must have kept the pressure on the Ministry of Works. The District Commissioner of Works informed the chief engineer of the Waikato Valley Authority in 1977 that he had ‘received repeated enquiries from the Maori Trustee’ about the blocks affected by the stopbank and asked the authority to advise what decision, if any, had been made. The matter drifted on to 1980, when a notice of intention to take an easement was published in September, but this was not followed up. There was more correspondence through the 1980s but no agreement was reached. No compensation has been paid for the stopbank works and this remains one of the unresolved issues in the construction of the oxidation ponds.

9.3.3 Disruption caused by construction of the stopbank

Kahukuranui Te Rangi described the disruption caused by the construction of the stopbank in his submission to the Tribunal:

At the time when the Ministry of Works sought to put a sewer line, a road and then a stopbank through the Te Rangi block . . . five households were living on this land, and Nanny Te Reiti Grace was leasing the land from us and farming it. The resident families sometimes with the help of the extended whanau, had established gardens and orchards on the land and kept pigs, poultry and ducks. They were able to live off what the land produced.

.

The stopbank ran through the northern, riverward part of the blocks. It divided the farm, cut through areas used for gardening, and destroyed two orchards. Topia Te Rangi's garden and orchard was completely destroyed, as was Meri Te Rangi's orchard. In the process some of the most fertile whanau lands were converted to stony, sandy mounds. About 50 or 60 acres of land was [sic] removed from productive use as farmland.

.

Also, the natural seepage and underground water table in the area has changed as a result of the stopbank construction. The deep drains which our family had formed and maintained in the past to control the water table in the area and allow us to farm it profitably were destroyed when the stopbank was constructed. (A13(1):2-3)

The family had investigated the planting of *Pinus radiata*, but some areas behind the stopbank were too swampy, the topsoil around the stopbank had been destroyed during the construction work, and the material in the stopbank itself was infertile. The land was also affected by the construction of the sewer line, as explained by Eileen Duff, a niece of Topia Te Rangi:

The sewer line and ponds have always been a very deep concern for us even to this day. The Ministry of Works people did talk to Topia Te Rangi but only to tell him that they would be laying the sewer line right through the middle of Waipapa 1D2B and Tokaanu B1H blocks. As Kahu [Te Rangi] has said, Topia tried to get them to agree to lay the sewer alongside Hirangi Road, but they would not listen. So they went ahead and just dug up the land and laid the pipes right through our land, both the main sewer and a network of branch pipes right down to the holding ponds adjacent to our lands. . . . After the drains were laid there was a lot of sand and stones left on the surface of the land and this ruined the pasture that was once there.

The Oxidation Ponds

This block had been discussed by the whanau as possible area for papakainga or residential settlement by some of our family and partitions had already been approved by the Maori Land Court. We were very annoyed to find that the sewer line would prevent us from building on or within a certain distance of the sewer line. (A13(2):3)

The problems facing families living on the residual lands west of the Turangi township are taken up again in chapter 10. We turn now to the actual operation of the oxidation ponds and, in particular, to the problems encountered in the disposal of the sewage effluent.

9.4 THE DISPOSAL OF THE EFFLUENT

9.4.1 Sewage facilities praised

The Ministry of Works had consistently maintained that the Turangi sewage treatment facilities were working well. At a meeting of owners at Hirangi Marae on 3 March 1968, Gibson commented that Turangi's sewage treatment system was 'the most modern and economical type' and 'envied by many New Zealand and overseas people'. He added that 'To operate the town we must take that land' (B10(c): doc 21). These comments may well have been addressed as much to the Taupo County Council chairman, H Besley, and the other county representatives who were present as to the Maori owners of the lands that had been occupied since February 1965 with no compensation paid and no proclamation to take yet issued.

9.4.2 The Taupo County Council takes control

On 1 May 1968, the Taupo County Council took over the operation of the sewage treatment facilities. By the late 1970s, discussions were being held between the county council and the Ministry of Works over the transfer of title. The Waikato Valley Authority was also involved and, in 1978, it inquired whether a Pollution Advisory Council permit had been issued for the oxidation pond discharges: no permit had been applied for or issued. Nor did it seem that section 31 of the Water and Soil Conservation Amendment Act 1973, which validated 'rights in respect of water for Tongariro power scheme', covered the taking of water for domestic supply for, or the discharge of storm water or sewage effluent in, the Turangi township. In short, the Ministry of Works held no valid water rights.

On 22 January 1980, the Commissioner of Works directed the project engineer to prepare applications for water rights under the Water and Soil Conservation Act 1967 for the taking of water for domestic supply and for the discharge of effluent and storm water (B6(a):174). An agreement was reached that the Ministry of Works would apply for these rights and then transfer them to the Taupo County Council. On 24 March 1980, applications were lodged by the Minister of Works with the National Water and Soil Conservation Authority. The procedure was that Crown applications for water rights would first be heard by the regional water board, in this case the Waikato Valley Authority, which would then make recommendations to the National Water and Soil Conservation Authority, which would actually issue the water rights.

The Taupo County Council lodged an objection to the Ministry of Works' application for a right to discharge sewage effluent on the grounds that 'the existing irrigation paddocks permit rapid infiltration and therefore little nutrient removal is obtained' (B6(a):186). The council's objection was supported by a report prepared by the Ecology Division of the Department of Scientific and Industrial Research (DSIR) in Taupo, which was based on field work carried out between November 1976 and February 1977. Dye tracer studies and collection of water samples at various points over this period indicated that there was 'a slow but definite movement' of groundwater from the Tongariro River westward towards the tailrace canal. This was not an unusual situation because the Tongariro River in the vicinity of the oxidation

The Oxidation Ponds

ponds was about three metres above the level of the tailrace, and this allowed water to leak through the delta sands and gravels to the canal. The DSIR's study indicated that:

groundwater is entering the tailrace canal from beneath the land disposal fields of the Turangi oxidation ponds and therefore there is a real possibility that nutrients percolating down to the groundwater could reach the tailrace canal and hence Lake Taupo. (B6(a):180–181)

9.4.3 Investigations conducted

The Waikato Valley Authority also conducted its own technical investigations. The DSIR report, while not conclusive, did indicate that some westward movement of groundwater was occurring. There was a further complicating factor in the Hangarito Stream drain. This had not been addressed in the DSIR report, which described it as a 'blind drain'. The Waikato Valley Authority report noted that, since being deepened in 1979, the drain now intercepted the surface and probably the subsurface flow from the disposal field to the tailrace and was not now 'blind' but flowed 'out into the swamp drain channel and then indirectly to Waihi Bay' (B6(a):189). The report also noted that the disposal area had not been properly maintained, with the border dyke drain either unreliable or totally weed-infested and unusable. Furthermore, livestock had pugged the ground near this drain with the result that the effluent simply puddled before flowing overland to the 'blind' drain, which was only 100 metres from the tailrace. Leakage from the drain to the tailrace was a distinct possibility and, indeed, the report concluded that there was 'clear evidence' of the indirect movement of effluent to Lake Taupo by means of the Hangarito Stream drain into the swamp

and by groundwater into the tailrace. If the management of the oxidation ponds was ‘substantially upgraded’, the flow of undesirable nutrients and chemicals from effluent could be reduced. What was required, the report said, was the recontouring and levelling of the disposal field, the building of a bank around the western portion to retain the waste, and the better control of livestock in the field (B6(a):190, 192).

In his summing-up of the technical reports, the Waikato Valley Authority resources manager agreed with the conclusion that there was ‘considerable movement of nutrients from the disposal site to water which has a direct link with Lake Taupo’, as well as ‘some groundwater flow carrying nutrients’. Reference was also made to a DSIR publication, *Interim Guide for Land Application of Treated Sewage Effluent*, which had been compiled by an interdepartmental working party.¹ The resources manager felt it to be ‘clear that the existing system is not being managed in accordance with these guidelines’. He stated that the system was disposing of the waste rather than treating it, and that steps needed to be taken to encourage the ‘evapotranspiration and uptake of nutrients by a crop or pasture’ to ensure that both processes occurred (B6(a):187). He recommended that the guidelines set out in the *Interim Guide* should be adhered to and listed a number of ways in which the existing operation of the Turangi sewage treatment facilities was deficient, including the unevenness of the disposal field, the poor maintenance of the irrigation ditches, the lack of control over the grazing of livestock, and the swampiness of the western portion (B6(a):187).

9.4.4 Problems acknowledged

The Taupo County Council's response to the Waikato Valley Authority's report was to agree that the disposal of effluent was not as effective as it should be, in that nutrients were reaching Lake Taupo. The county engineer argued, however, that this was a question of construction rather than poor management (B6(a):198). However, it was agreed that 'concepts of effluent disposal' which influenced the design of the disposal area in 1964 did not meet the standards of nutrient removal later recommended in the *Interim Guide's* guidelines.

Another technical report produced by the 'Hamilton Science Centre' (being the Water and Soil Division of the Ministry of Works) suggested that the input of phosphorus and nitrogen from the oxidation ponds to Tokaanu and Waihi Bays was 'minimal when compared with the natural input' (B6(a):196). This was not the central issue. What was important was the prevention of additional nutrients entering the lake, as the Taupo County Council pointed out (B6(a):197).

In its report to the National Water and Soil Conservation Authority in September 1980, the hearing committee of the Waikato Valley Authority observed that the reliance on the 1958 Order in Council to discharge waste water where it might come into contact with natural water was 'at risk and accordingly actionable'. The current problem was assessed to be the result of 'improper management' since 1968 and the 'limitations of construction in the first instance'. At any rate, the ponds and irrigation drains were considered 'overdue for some form of reconstruction' (B6(a):204).

9.4.5 Upgrading

A water right for five years was subsequently granted by the National Water and Soil Conservation Authority, which included a condition that the disposal area, of no less than 12 hectares to serve 6500 people, was to 'be formed and managed to provide irrigation treatment' which complied with the *Interim Guide's* guidelines. The Taupo County Council objected to the shortness of the term, arguing that if substantial capital works had to be undertaken to upgrade the disposal area then a longer period was justified. It was subsequently agreed that the five-year period would begin when the upgrading, to be carried out by the Ministry of Works, was complete. The completion date was to be December 1983 but it was not actually finished until 1985.

The required upgrading was considered in 1981 to be the recontouring of the disposal field and the formation of bunds around it (B6(a):215). By early 1983, the plan for upgrading had been reviewed and a new design developed. In March 1983, the Ministry of Works sought from the Waikato Valley Authority another variation of the Crown water right that had been issued in August 1981, which had specified 'controlled flood irrigation' as the means of disposal of effluent from the oxidation ponds. Because of the high water table, the Ministry now sought approval for 'an Overland Flow system' (B6(a):221). The application was treated as a minor variation under section 24B(2) of the Water and Soil Conservation Act 1967 and was approved.

This change in design can best be understood in relation to the diagrams in figure 30, which are redrawn from the *Interim Guide*. The main objectives in discharging effluent on land are the treatment of the effluent to improve its quality and the disposal of the effluent. Other objectives can also include irrigation to supply moisture and nutrients to crops or tree plantations, and the recharging of groundwater. However, in the swampy conditions at Turangi, the latter objectives were not so relevant. The principal approaches to land

disposal, as described in the *Interim Guide*, are irrigation treatment, overland flow or grass filtration, and rapid filtration or controlled flooding.² Although disposal could be by a sprinkler system, the method chosen at Turangi was controlled flooding from a header canal to plots in the disposal area. There was no guarantee of the effectiveness of the system. The *Interim Guide* commented that the success of land application largely depended on a range of factors, including soil type, vegetation cover, climate, effluent type, and site management.³

9.5 TRIBUNAL'S COMMENTS

In the 1960s, there was little experience in New Zealand of land disposal of sewage effluent. The 1976 *Interim Guide for Land Application of Treated Sewage Effluent* was the report of a working party convened by the DSIR in 1974 at the request of the Officials Committee on Eutrophication. The foreword to this report made it clear that this was only an interim set of guidelines supported by some relevant background information, and noted that 'the optimum operating conditions will differ with each site, and must be the subject of specific investigations before any system is put into operation'.⁴

The Tribunal accepts that, in 1965, when the Turangi oxidation ponds and effluent disposal system were put in, this was an innovative way of dealing with sewage. However, while problems with the system of irrigation ditches were identified in 1966, little seems to have been done at that stage. The whole of the discharge area was not trenched and the lower, swamplier part to the west became, by default, an area of overland disposal. When the Hangarito Stream drain was deepened in 1979, the overland flow of effluent was accelerated. There was also an ongoing flow of effluent into groundwater moving westward to the tailrace. Over the period 1965 to 1985, there was a flow of nutrients from the disposal area into the Tokaanu swamp lands, the tailrace, and the waters of Lake Taupo, which aggravated an existing problem of eutrophication in Waihi and Tokaanu Bays.

During this time, there appears to have been little or no monitoring of the situation. The discharge of effluent proceeded without any permit from the former Pollution Advisory Council, the Waikato Valley Authority, or the National Water and Soil Conservation Authority under the provisions of the Water and Soil Conservation Act 1967. The provisions of section 311 of the Public Works Act 1928, which were the authority for the 1958 Order in Council claimed by the Ministry of Works at the water rights hearing before the Waikato Valley Authority in September 1980, do not, even when interpreted most liberally, grant any right to dispose of sewage effluent from a town the size of Turangi into natural waters. The authority's hearing committee suggested then that relying on the Order in Council was risky and 'accordingly actionable', although no action appears to have followed.

The Crown water right finally issued to the Ministry of Works took effect in 1985, was transferred to the Taupo District Council in 1989, and expired in 1990. In June 1990, an application to replace it was lodged. We append a statement supplied to the Tribunal by Environment Waikato of the Waikato Regional Council in December 1994 (D4), which sets out the status of this water right application (lodged before the passing of the Resource Management Act 1991) and the operation of the Turangi sewage treatment facilities since 1985 (see app V). Mr Alexander advises in his report on matters ancillary to the Turangi claim that the Waikato Regional Council issued a new discharge permit with effluent upgrading requirements in March 1995 (D11:12).

9.6 CLAIMANTS EXPRESS CONCERN

The Ngati Turangitukua claimants expressed their concern to the Tribunal about the pollution of Taupo lake waters by effluent discharged from the Turangi oxidation ponds. Reneti Church, who farms the adjacent land, stated in her submission:

At the back of the oxidation ponds there is a drainage system which runs into a sort of lagoon that has formed. The lagoon drains into a canal which runs straight out into a swampy area and then the lake. This means that sewage is running into our lake. The fluid that runs through the canal is dark green and smells terrible. I don't know whether it is treated sewage or not, but it should not be running through an open canal, and it should not be running into our lake. (A15:5)

Arthur Grace stated:

There is no doubt in my mind that toxic material and enriched nutrients are going down the Hangarito Stream and down the tailrace into the lake. The outlet of the Hangarito Stream into the swamp is very close to the oxidation pond, and as a result there is considerable enrichment and pollution of the water in the swamp, which feeds down into the lake. The theory is that the swamp acts as a filter for the pollutant material, but in fact there is virtually an open channel at the point where the Hangarito Stream meets the swamp, and on out into the lake. This has led to a big increase in weed growth in Tokaanu Bay and Waihi Bay.

Our lake, and in particular those nearby bays, are precious taonga of our people. The weed and pollution has ruined Tokaanu Bay. It used to be a beautiful area popular for fishing, swimming, gathering of carp, koura and inanga. You can't take kakahi from there now. There's a sort of black sludgy slime that's forming where the raupo touches the water. It squelches and smells. This has been terrible for our people. (A21(1):33-34)

Mahlon Nepia stated:

The Oxidation Ponds

Ngati Turangitukua people are very concerned about the level of pollution in our waterways today. . . . we have real doubts about whether the swamp is acting as an effective filter for sewage pollution, and we think it is high time that a proper investigation of this situation is undertaken. . . . There is something terribly amiss with the water in our lake. This is clear from the vast weed growth and slime deposits in Tokaanu Bay and Waiariki Stream which is adjacent to the sewage ponds. The rohe of Ngati Turangitukua abuts Lake Taupo and like other hapu we hold custodial rights over our waters. It has always been part of our responsibility to ensure that our lake stays pure and free from pollution. But since the construction of the town and the Tokaanu tailrace, pollution levels have grown significantly. As tangata whenua, the rectification of this situation has been entirely beyond our resources. (A21(3):26)

Other claimants also expressed their concerns about sewage effluent flowing into swamps where there are old urupa; in particular, the place called Mangakopikopiko, which was referred to during the negotiations with the Crown over the Tokaanu swamp lands exchange in the late 1960s.

9.7 CONCLUSIONS

The claimants have serious concerns about the discharge of effluent from the Turangi oxidation ponds. There is insufficient scientific information to assess these concerns. Eutrophication of lakes is a natural long-term process, as normal erosion and stream flow carry nutrients from the land to lake margins. However, when nutrient flows are increased by fertiliser applications and accelerated rates of run-off from land developed into pasture, or by storm water and sewage effluent from a town, there is a greater potential for the growth of algae and aquatic weeds in the shallow waters of the lake margins. The impact of the disposal of the sewage effluent also needs to be considered in relation to the Hangarito Stream drain, which is discussed in the next chapter.

No firm conclusions can be reached about the relationship of the Turangi sewage treatment facilities with the quality of Lake Taupo waters in Waihi and Tokaanu Bays. The Waikato Regional Council has a statutory obligation to investigate these issues and impose constraints on any activity that contributes to the pollution of natural waters. The Tribunal can only endorse Environment Waikato's intention to require the Taupo District Council to 'put in place a monitoring programme to more accurately identify the effects of this discharge on the environment' (see app V). If it can be demonstrated that there is no longer any direct flow of nutrients, and that effluent from the oxidation ponds is effectively purified by the land disposal system

The Oxidation Ponds

that is in place, the claimants' concerns about the contamination and desecration of wahi tapu may be diminished. We consider that this is a matter which should be treated with some urgency by Environment Waikato. Whether the new discharge permit issued by the Waikato Regional Council in March 1995, which contains effluent upgrading requirements, will ensure the effective purification of effluent from the oxidation ponds remains to be seen. An effective monitoring system is essential

-
1. C D Stevenson (comp), *Interim Guide for Land Application of Treated Sewage Effluent*, DSIR Information Series No 114, Wellington, Government Printer, 1976
 2. Ibid, pp 7–8
 3. Ibid, p 8
 4. Ibid, p 4