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Athol Ashford Pty. Limited : environmental impact statement :
mining and processing of topaz ore near Torrington mining
lease application 51 (Inverell)

EIS 941

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DEPT OF MINERAL RESOURCES ①

ATHOL ASHFORD PTY. LIMITED
ENVIRONMENTAL IMPACT STATEMENT
MINING AND PROCESSING TOPAZ
ORE NEAR TORRINGTON
MINERAL LEASE APPLICATION 51
(INVERELL)
APRIL 1987

NSW DEPARTMENT OF
MINERAL RESOURCES

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ATHOL ASHFORD PTY. LIMITED

ENVIRONMENTAL IMPACT STATEMENT

MINING AND PROCESSING OF TOPAZ ORE NEAR TORRINGTON

MINING LEASE APPLICATION 51 (INVERELL)

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CERTIFICATE

Clause 59 Environmental Planning and Assessment Regulation 1980

ENVIRONMENTAL IMPACT STATEMENT

This Statement has been prepared on behalf of ATHOL ASHFORD PTY LIMITED, being the proponent of an activity that requires the approval of the Minister for Mineral Resources as the determining authority.

The Statement accompanies Mining Lease Application No. 51, Inverell made in respect of the activity described as follows:

Part of unalienated Crown land, Tenterfield Shire,
Land District of Tenterfield, Parish Rockvale,
County Clive, and
Part of Torrington State Forest No. 320,
dedicated 5th January 1917, Tenterfield Shire,
Land District of Tenterfield, Parish Rockvale,
County Clive.

The contents of this Statement as required by clause 57 of the Environmental Planning and Assessment Regulation 1980, are set forth in the accompanying pages.

Name, qualifications and address of person who prepared Environmental Impact Statement.

Gordon Arthur SHEPHERDLY
588 Fig Tree Pocket Road
FIG TREE POCKET QLD 4069
Geologist, Company Director

I, Gordon Arthur SHEPHERDLY, of 588 Fig Tree Pocket Road, FIG TREE POCKET, QUEENSLAND, hereby certify that I have prepared the contents of this Statement in accordance with clauses 57 and 58 of the Environmental Planning and Assessment Regulation 1980.

Signed.....

Date.....

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CERTIFICATE

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ENVIRONMENTAL IMPACT STATEMENT - MLA 51 INVERELL, ATHOL ASHFORD PTY.LTD.
.....

INTRODUCTION.

The lease application is situated on the northern contact of the Torrington Pendant, which is enclosed within the Mole Granite; a partly dissected plateau about 1,100 metres above sea level, the Mole Tableland, includes the small village of Torrington, which is about 15 kms. to the south east of the application, and 27kms. from Deepwater, the nearest railhead, situated on the New England Highway, between Glen Innes and Tenterfield, Northern New South Wales. Grafton sheet, 1:250,000 geological series, SH 56-6; Parish Rockvale, - County Clive, Tenterfield Shire.

The shareholders of the applicant company have since 1968, prospected and studied the low grade "silexite" (topazite) ores of the Pendant, both as a family operation, and in conjunction with Metal Traders Ltd., Melinga Mining & Finance through the vehicle of G.Whitburn Pty.Ltd., our original family company, and more recently through the joint venture with Pacific Copper Limited.

Athol Ashford, in conjunction with Torrington district miners and contractors, will mine and develop this lease application area if granted, in its own independent programme, applying the geological, metallurgical and marketing knowledge acquired during that eighteen year period. This will include commercial development of topaz resources, following the original concept of our work with the Geological Survey branch of New South Wales, and tests performed by C.S.I.R.O., and our Pacific Copper -Ashford joint venture.

INTRODUCTION (continued)

The orebodies within the boundaries of MLA 51 are similar in geology and metallurgy with those on Pacific Copper - Ashford areas, and the benefits of the accumulated data, including milling operations, will be applied to these orebodies within the application area. In addition to our own practical experience, we have continuous access to experienced geologists, metallurgists and mining engineers, and are therefore confident in the future viability of the project, free from any extraneous decisions by other parties

The extraction of the silixite ore will be by conventional open cut methods, with topsoil pre-stripping and stacking for progressive rehabilitation utilising the strong regrowth characteristics of the district.

Ore dressing methods will be by staged crushing and screening, with gravity separation by jigs, tables, magnetic separation and possibly heavy media processes at a later stage. No chemical processes are involved, or re-agent addition; all water is recirculated within a closed reclaim system of settling and tailing dams.

No other type of pollution is generated, and the nearest settlement is the village of Torrington, about 15 kms. distant.

Any conversion of topaz to mullite etc., will be performed elsewhere.

History of Investigation.

1.1 Athol Ashford Pty.Limited is a family company of the Shepherdlys who initially became interested in minerals in the Glen Innes district in 1951, when our managing director Gordon Shepherdly became personal assistant to Emeric Moskovits at Kingsgate, studying the metallurgy of wolfram, bismuth, tin and molybdenum under that capable gentleman, who later became a foundation scientist with AMDEL in Adelaide.

When Kingsgate operations were closed down by the Sydney principals, due to mineral depletion and recession, we commenced our own prospecting activities at The Gulf, north of Emmaville, which resulted in the application of several mining leases at the McCowen and Nine Mile deposits on the western margin of the Mole Granite. Wolfram fissure vein deposits were discovered, and a new 50 t.p.h. mill installed to produce high grade wolfram concentrates, which were contracted to Metal Traders Ltd., London, who became interested in our development, and formed an Australian consortium to acquire a controlling interest in our existing family company, G.Whitburn Pty.Ltd., together with the existing leases, prospecting licences and other applications over extensions of the Butler lode, and the old deposits at Torrington included in the Torrington Pendant structure.

We were influenced to believe that transfer of our controlling interest would be beneficial to the project as a concept through adequate funding, which we accepted, transferring our interests and control of Whitburn without any cash consideration. In due course, the consortium mined out the known orebodies, and performed extensive adit developments in several similar vein structures at The Gulf and McCowens; however, bad judgement by the Sydney principals and introduced management brought about the disbanding of the consortium, the closing of the mines, and transfer of control of assets and the

1.1 (continued)

Whitburn company to Kingsway Minerals N.L. That group cancelled leases and applications, dismantled the mill and associated plant for sale, and completely withdrew from the area.

Our family preserved the workforce of about 26 men and established sapphire mining operations at Glen Innes, the proceeds from which funded in part the later prospecting programme at Torrington, on titles purchased for cash from Abaleen - Vale, and our own prospecting area included in the present application MLA 51. By 1973, we were fully engaged at Torrington on wolfram and topaz investigations, introducing to the concept in the period, many major mining companies who we considered suitable to develop the large low grade deposits, over the total area of the Pendant and Mole granite; however, title problems which included the establishment of government Reserves over our current Authorities to Prospect and further applications, due to Departmental error, precluded the conclusion of any suitable joint venture with any major company. During this period, we also preserved the status of the Whitburn applications ^{lodged} originally by our family, on the understanding with Kingsway directors that they had no further interest in wolfram, topaz or the area generally, and whose directors patently ignored Departmental correspondence on the matter over a long period. These titles now form the present Whitburn authorities, held by the present Kingsway structure, which became interested in Torrington again only after we introduced Pacific Copper Ltd., into the project in 1976, and following the important topaz investigations.

1.2. During the operation period of our new mill at McCowens, we sampled the silicite outcrops and old workings on our A.to P. 153, now included in this current application, and although we were very occupied with the underground mining at The Gulf etc. at the time,

1.2 (continued)

our sampling programme established the future methods of grade assessment and metallurgical treatment for the wolfram ore, plus geological mapping of the granite - metasediment contact zone; this included dewatering of the old shafts and pits, soil sampling, silicite sampling from faces and outcrops, crushing and concentrating the heavy components for grade estimation, and the provision of concentrate samples for market testing. Costeans and backhoe pits were effective in exposing some extension of the outcropping silicite concealed by soil and sediment cover. A system of mobile jackhammer drilling, with screwed extension rods, as suggested by Newmont geological staff, proved useful under the limited circumstances of the A.to P.

We have found confirmation of our grade calculation methods, during the more recent drilling and mining operations on our joint venture Pacific Copper areas, where some 150,000 tonnes of silicite were mined and milled from several outcrops. Included in the mined areas, were three of the original Southland percussion drill holes, where the very low grades in lab. analysis from that programme indicated uneconomic mineralisation levels, but where our milling results were considerably higher.

As wolfram and bismuth mineralisation of the silicite is extremely variable, it has been recognised by competent geologists that interpretation of normal drilling results is not sufficient in determining ore grades; however our experience enables us to project grades for any given exposure, taking into account all known factors, and some original research into a geophysical method has proven useful. Of course, topaz values can be determined by drilling generally, but quartz rich phases and pegmatite development within silicite bodies can influence the results. Fine topaz also occurs in aplites.

1.3 Geology

The Mole Granite underlying the Torrington Pendant is a fluorine, lithium, rare earth enriched, high - silica pluton of dominantly granite/adamellite composition, containing significant tin, wolfram and bismuth mineralisation (Weber, 1975, reported over 150 associated mineral deposits.)

The sedimentary series intruded by the Mole Granite, and which forms the Torrington Pendant, comprises hornfelsed siltstone, fine sandstone, and indurated conglomerate. The hornfels described by Lawrence & Markham (1963) consists predominantly of biotite and quartz with occasional porphyroblasts of andalusite and cordierite; also Lonergan (1971)

Occurrences of aplite, microgranite and pegmatite, (with or without vein quartz) are common in the contact zone of the Pendant, in both granite and metasediments; these rock types and sillexite occur in the same body, and are apparently intrusive.

Pegmatites within sillexite or in associated dykes, are varied in composition, containing such mineral as topaz, fluorite, quartz, biotite, zinnwaldite, feldspar, tourmaline, and monazite, as well as the metallic minerals.

Sillexite, or topazite, is a quartz - topaz granular intrusive, formed either along the granite - metasediment contact, or within either rock type themselves. The contact bodies are composites of flat to inclined sillexite of low dip angle, with considerable aplite and granite zones. Other expressions of sillexite are as narrow dykes, which may prove to be related to the feeder mechanism of the ore rock, and will be drilled to depth at a later stage of our project.

Sillexite emplacement may be joint controlled, as dykes exhibit pronounced north easterly and north westerly trends, as do the granite joints.

1.3 (continued)

7

Silexite is medium grained, of 2 - 3 mm average, and topaz ranged from 3 microns in hornfels, to 2.6 mm in silexite, with a mean bulk grain size for eleven samples sent to B.H.P. Research Lab. of 0.28 mm. Occasional larger masses of pure topaz occur within silexite.

Monazite is an early constituent of silexite, lithium micas belong to pegmatite phases, and wolfram is probably of pneumatolytic origin, and is generally interstitial within the quartz - topaz grains structure of silexite, or massive within pegmatite quartz phases, as ferberite.

Topaz occurs as subhedral or sometimes prismatic crystals arranged along the quartz grain boundaries, producing a discontinuous network texture.

Topaz and wolfram are both liberated almost completely at 60 mesh Tyler (250 microns)

Bismuth as the native metal and carbonate secondary product is associated with wolfram mineralisation, and has been identified in polished section as veins in ferberite, following or transgressing cleavages, and of hydrothermal origin.

Average grades are :- for the major components,

<u>Silexite</u>	wolfram	0.15% Wo 3
	bismuth	0.05% Bi
	topaz	15 - 20 % by weight.

During the period of our investigations at Torrington, we have had complete access to the drill samples derived from 156 holes drilled in silexite bodies, totalling 3500 metres, including coring of many holes, and were involved on site during most drilling operations, including the sampling procedures, splitting and panning; in addition, we salvaged the splits of the Southland percussion samples from the Torrington Hotel in 1970, derived from 52 holes, and 1430 metres.

1.4 Silexite reserves.

Proven and probable reserves of silexite on the application area are 1.2 million tonnes, with possible extensions underlying soil and metasedimentary cover, and possibly feeder dykes which will be exposed as extraction proceeds; this could provide a further two million tonnes.

Although we have shown on the map an unbroken area of silexite - aplite extending northwards from the Pendant - Mole Granite contact, this is not a continuous development, but rather, broken and thin silexite float, generally shed from narrow dykes within the granite, or sheet like, thin silexite overlying the granite, as is the case in contact zones surrounding the Pendant.

We have always maintained against some opposition, that it is reasonable to expect the development of flat lying contact silexite development, at the granite - metasediment interface, but not visible in outcrop; this theory has been proven correct in one location, by drilling, and should be repeated.

Environment Planning & Assessment Act 1979,

Regulation 57 (2) a. Description.

2.1. The lease application area covers a section of the Torrington Pendant - Mole Granite contact, where a minimum of 1.2 million tonnes of silicite rock occurs; this rock consists of quartz and topaz in varying proportion, averaging about 20 percent topaz, together with low grade wolfram, bismuth and tin mineralisation, and minor associated precious metals, the wolfram and bismuth averaging 0.15% W_o_3 , and 0.05% Bi. Other minor elements may be of economic value.

Based on experience gained over many years of investigation and development of adjacent, similar orebodies, reasonable geological inference indicates further possible resources of mineralised silicite in the order of a further two million tonnes; this projection depends on deeper extensions of the sill like structures, probably as feeder dykes, or true contact bodies.

2.2. The proposed method of extraction of the silicite is the only economic alternative, in view of the low grade mineralisation, that is by open pit mining, incorporating the opening of several pits at one time, to allow blending of the variable ore grades, and the development of ore stockpiles against inclement weather conditions.

Pre-mining preparation will include stripping of soil and stacking for rehabilitation, overburden stripping where applicable, and stacking adjacent to pits.

The total area expected to be mined is eighty hectares, with five hectares open at any one time, and fifteen hectares under various stages of rehabilitation.

2.2 (continued)

The development of pits will be by standard benching methods, including safety benches and access ramps, the dimensions of each pit opening will be typically two hundred metres by fifty metres; depth of workings will be variable, controlled by the elevation of the granite basement underlying the orebodies, but not expected to exceed sixty metres.

Overburden varies from nil to a ratio of 2:1. Stacks will be battered to a low safe angle, not exceeding 45 degrees, as directed by the Minister under the terms and conditions as specified in the lease if granted.

Ore cuts will be broken out by one afternoon firing per day, of gel primed Anfo charged into fifty millimetre holes drilled by mobile percussion rig, on a one to two metre pattern, to five or six metres depth, distributed over a face length of twenty five metres.

The machines to be engaged in stripping and stacking topsoil and overburden will be wheeled scrapers and pusher dozers, either wheeled or tracked according to ground conditions, and Ministerial direction.

Loading out of broken ore will be by wheeled loaders, filling standard tip trucks for transport to mill.

2.3 Reinstatement of the mined sites after final extraction of ore will be according to Ministerial direction under the terms and conditions of any granted lease, but is expected to be respreading of previously stacked topsoil component over overburden waste.

Fast regrowth of existing native species occurs without interference, due to the natural mineral constituents of local soils, including potash, and reliable rainfall patterns.

These native grasses, bushes and trees soon form a binding mat against erosion.

2.3 (continued)

This regrowth characteristic, coupled with the binding ability of the natural clay content, has been demonstrated positively by the evidence of the pits and dams opened or constructed during the productive years of Torrington Pendant mines, which have stood firm since the years 1912 - 1920 to this day.

Major pits will be converted to permanent water conservation units, to provide a reliable water supply for animals, fire control purposes etc., as the local creeks are juvenile and sporadic in flow.

2.4. Road construction for all weather access to the lease application area will be by agreement with the owner of adjacent grazing land, and will replace the present unreliable bush track, closed often in wet weather. An alternative access route will^{be} constructed to co-ordinate with the commercial development of adjacent mining titles, and with the local fire control authority and Forestry Department.

New haulage roads will be constructed, suitably crowned and drained, to service the pits for the use of trucks supplying the mill, but contained within the boundaries of the lease application area.

2.5. Water conservation dams will be constructed on site according to specifications of the Soil Conservation Service, and Water Resources Commission. These will be of earth wall construction, not within existing creeks, and will supply water for milling extracted ore. The mill will operate on a closed circuit, water settling and reclaim system as specified by the relevant authority.

The source of conserved water will be retained natural run-off, or pumped from Bald Rock Creek when flowing, and under Licence.

2.6. Milling of the ore and production of commercial products will be by gravity concentration methods only, with no chemical re-agents or processes. Details of the concentrator plant are provided in section 3 of this statement, together with marketing information, and product projections.

The products will be premium grade wolfram concentrates, topaz concentrate identical with that already produced in commercial samples on our associated joint venture adjacent property, which is suitable for conversion to mullite refractories, ceramic applications, and possible further uses, currently under active investigation, plus mixed bismuth, precious metal and rare earth concentrates for further treatment. Certain components of these concentrates will be applied to secondary processes within Australia, to enhance their value, and to assist with the drive to increase our exports towards meeting balance of payment difficulties. Some products will replace presently imported secondary materials, essential to Australian industry.

The principal waste product will be finely crushed silica sand, a substantial proportion of which may be sold to local shires, ready - mixed concrete producers and councils, according to future demand.

Additional waste will be a small percentage of the ore rock as mined, consisting of clay slimes, held in settling dams.

Silica sand will be produced in the proportion of about 0.8 million tonnes for each million tonnes of silexite milled, and may be of interest also to glass manufacturers, foundries or brickworks.

2.7 The life of the project is expected to be a minimum period of six years, but more probably fifteen years if ore reserves develop during mining of known orebodies; this is based on an extraction rate of 200,000 tonnes per annum, but as markets are developed for topaz or

2.7 (continued)

its associated products, and as the demand for wolfram strengthens again, or sales contracts are established for other co-product minerals, and/or secondary products, the applicant company will increase the extraction and milling rate accordingly, probably by a factor of three times the initial estimate.

2.8 The required labour force to be drawn from local sources, will be initially fourteen persons, increasing progressively as additional shifts are introduced at the mill to thirty, plus contractors .

Mining will be conducted during the daylight hours only, and milling through three shifts in stages.

Ore haulage will be restricted to daylight hours, 7 a.m. to 6 p.m., Monday to Saturday inclusive.

Proposed mining hours and days are, 7 a.m. to 5 p.m., Monday to Saturday inclusive.

Proposed milling hours and days are, three shifts round the clock, Monday to Saturday inclusive.

Employee labour will be recruited from Torington, Deepwater, Emmaville, Glen Innes and possibly Tenterfield, with daily travel.

No on site accommodation necessary, other than for manager and caretakers.

2.9 CONSTRUCTION TIMETABLE. Roads, millsite, dam construction and filling, tailings ponds, and pit preparation 4 months lapsed time. Mill construction 6 months, plus two months settling in prior to full scale production. Lead time for major crushing units is approximately 6 months.

2.10 Topaz concentrate transport will be by container conveyed on standard semi-trailer, routed via Torington, Deepwater to Brisbane. Frequency, based on projected annual ore milling capacity, would be four or five times daily during daylight hours, and would therefore have no environmental impact outside existing practice.

Conversion to mullite will be effected in Brisbane for the foreseeable future.

The conversion process is by rotary kiln calcination, following blending with high alumina clay, such as kaolin, and granulation. The conversion to mullite is achieved in the temperature range 1250 to 1500 degrees Centigrade, and water scrubbing is used to extract fluorine as fluosilicic acid or H_2SiF_6 ; the resulting calcine is an artificial mullite, with an alumina content ranging from 70 to 76% Al_2O_3 when fused. Torington topaz is high in fluorine content, and low in fluxing alkali, both favourable characteristics, and high intensity magnetic separation during concentrate production ensures minimal opaque oxide content, resulting in a pure white mullite of excellent crystal characteristics.

Regulation 57 (2) b. Objectives.

3.1. The applicant's objective since commencing investigations on The Torrington Pendant in 1968, have always been stated clearly to be the establishment of a viable, long term continuous development of the mineral resources of the district, including wolfram, tin and topaz, together with other minor co-product minerals.

Naturally the project must be profitable to a degree related to the capital investment committed, and to allow for re-investment of proportion of profits towards extending the life of the project, based as all mining projects are on a diminishing asset.

A key point in our strategy is to provide for secondary processing of concentrates where possible, rather than the sale of raw products, generally to overseas purchasers, where on conversion the relevant secondary products are then re-imported into Australia at higher unit cost, which in turn aggravates the import imbalance and current account budgetary problems of this nation.

The applicant company has examined the alternatives for wolfram conversion to tungsten metal and powder since 1975, when negotiations with The Broken Hill Proprietary Company Limited resulted in a contract for conversion and purchase of wolfram secondary products for their Australian manufacturing requirements, plus options for further quantities for export to Sweden and Taiwan, over a ten year period.

Furthermore, recent investigations for conversion and value enhancement of topaz concentrates to secondary and tertiary products replacing presently imported materials vital to the steel, alumina, cement and ceramics industries, have resulted in positive advancement to commercial operations presently planned by our Pacific Copper joint venture.

3.1 (continued)

Original research by the principals of the applicant company has resulted in the identification of several minor minerals associated with the ore rock to be extracted, and our metallurgical experience with complex bismuth ores over many years will enhance the possibility of recovery of additional values during the wolfram - topaz processing procedures, which in turn will strengthen the financial base towards establishing the sound, properly managed long term development of the resources of the Torrington area as a global concept.

In summary, the overall objective is to mine the total silixite reserves, and to mill the ore for all minerals recovery, including wolfram (tungsten), topaz, silica sand, and minor bismuth, tin, precious metals, monazite etc., for sale through local and export markets, including the conversion to secondary and tertiary products where practical. It is intended to continue with our policy of re-investment of substantial proportion of profits to consolidate the future viability and continuity of the project for as long as reserves of ore are available, creating job opportunities in the district, royalty payments for the Department of Mineral Resources and shires, and export earnings for Australia.

3.2. Milling of the ore will be by conventional gravity separation concentrator, consisting of crushing in staged reduction, screening, sizing, jigging, tabling, and magnetic separation, both wet and dry; tailings consisting mainly of silica sand will be dewatered and stacked pending future sale, according to demand; minor clay slimes will be held in settling dams until drained.

Primary crushing is by jaw crusher, followed by gyratory secondary, short head cone tertiary, and sand cone quaternary, all but the primary

3.2. (continued)

crushers are closed circuit systems on vibrating sizing screens, to allow for minimum sliming of the brittle minerals, conforming to the well known axiom "recover the mineral as soon as free" (Denver, Colo.)

Recovery of minerals is by several stages of jigging over modified Yuba type jigs, these modifications being based on previous experience of our principals in wolfram recovery dating back to 1951 through 1976; tabling over Wilfley tables, and wet magnetic separation follows standard practice, with high intensity crossbelt magnetic separation finally separating the magnetic and non-magnetic components into premium grade wolfram concentrates, and a mixed bismuth - tin - minor mineral bulk concentrate for further closely controlled hydrometallurgy.

Topaz concentrate is taken off continuously from its own jig - table circuit at grades suited to individual market specifications; it is probable that heavy media cycloning will be applied to a proportion of the concentrates, and possibly electrostatic separation for ultimate removal of silica content, to meet special requirements.

No chemicals are required to be added to mill pulps or water systems.

The water supply is from constructed dams within the closed circuit system, providing for water reclaim, tailings dewatering and stacking, and slimes settling. Initial filling of supply dam from conserved surface run-off, providing suitable rainfall during mill construction period; a circulation of about 1300 gallons per minute within the system (5850 litres) is required, with top up requirement maximum one third tonne per tonne of ore milled (666 kgs.)

Further conservation in additional dams is planned progressively, to cushion the effects of short term drought cycles.

Power requirements for the mill will be met by diesel - electric generating sets on site, with later connection to the County Council

3.2 (continued)

high voltage line already installed to the Bismuth mill site of the joint venture.

Ore feed to the mill will be by tip trucks during daylight hours, and by wheeled loader from ore stockpile as required.

3.3. The projected production of concentrates for the various products is, for each million tonnes of silixite mined and milled :-

Wolfram Based on 0.15% head grade Wo 3, and 80% recovery,
... 120,000 units Wo 3, or 1,846 tonnes 65% concentrate.

Topaz. Based on 20% topaz content in silixite, and 65% recovery,
.... 130,000 tonnes of 100% topaz, or equivalent.

Bismuth etc., Based on 0.05% Bi, and 60% recovery,
.... 300 tonnes contained bismuth, plus minor tin,
monazite and precious metals.

Known reserves of silixite established at 1.2 million tonnes, with possible further resources up to two million tonnes.

3.4. The marketing outlook for the products are as follows :-

Wolfram The price and demand for wolfram concentrates is still depressed, following the protracted world recession, but should improve in the medium term; communist China holds the main world reserves, and has dominated the market for several decades. The current quotation has been held at around \$45 U.S. for a year or more, for each metric tonne unit of 1% Wo 3 . The U.S. government G.S.A. stockpile has very substantial holdings, and also effects the demand.

TOPAZ. Continued interest has been demonstrated in this material by Australian and overseas companies, for use in refractory applications, for fluxing in smelting operations, and as a possible source of fluorine; however, the wide recession

3.4 (continued)

has delayed commercial development of this resource, although we are confident in the long term outlook. The application of topaz has not been adopted by industry to these uses to date, but continuity of supply of a consistent specified product will encourage change over from existing conventional alumina sources, and direct conversion to mullite and other compounds by this company or its associates, will not require major changes in industrial philosophy where topaz in the raw state has not previously been sought, (with one or two small scale and experimental exceptions in India and the U.S.)

There is therefore no existing market place for topaz concentrates, but the predicted price range is likely to be in the A\$35 - \$100 per tonne range for specified size and purity. For a calcined, high alumina mullite product or other derivatives, the unit value would appreciate by a factor of two or three times.

The Australian market could only absorb a small proportion of the total production available from Torrington, but this would replace present imports, leaving the balance available for export contracts.

The applicant company is also investigating the possibility for an entirely new application of topaz, not previously considered, which if successful will consume a substantial proportion of the production, together with various other components of the silixite to be recovered.

Regulation 57 (2) c, Description existing environment.

4.1. The application is entirely restricted to crown land. Approximately two thirds of the area of the application included in the northern section, is very rough and steep unimproved granite country of the Mole Tableland, with large areas of bare, massive boulder outcrop cut by steep gullies. Mineralisation of the granite in this zone is negligible.

Approximately one third of the application area contained in the southern section, is included in the Torrington State Forest, which in this portion, is mainly poor quality timber and scrub.

Drainage is to Black Swamp and Bald Rock creeks, of intermittent flow.

The northern boundary fence of the Torrington State Forest runs generally east - west through the southern third of the application, and was originally surveyed obviously to coincide with the geological contact zone, between the sediments of the Torrington Pendant, and the Mole Granite to the north, which becomes very rough and rugged. It is along this contact zone where ore rock as silicite is developed to any degree; however, this zone of the State Forest does not contain commercial milling timber, and was established initially to provide local timber for the young mining industry of the day.

Soil is derived from the weathering of the Pendant sediment types, claystones, mudstones and shales within the State Forest area, and from the Mole Granite in the northern area, which forms a very poor, coarse granular quartz sandy cover, excepting for narrow soil development along the water drainage channels, often associated with swampy conditions, and high in clay content. This variable cover supports native trees and scrub subjects as listed in Andrews (1916) with some poor quality, low nutrition native grasses in limited areas.

4.1. (continued)

Flora identification by Andrews, quotation :-

"Within the plateau of New England at an elevation of 3000 to 4500 feet, above sea level, the more characteristic plants are :- stringy barks, (Eucalyptus eugenioides, E. macrorrhyncha, E. capitellata) brown gum, (E Deanei) blackbutt (E.Andrewsi) cabbage gum (E.Bancrofti) white peppermint (E.Bridgesiana) white gum (E.rubada) black oak (Casuarina suberosa) in dense thickets, tea trees (Leptospermum) of various types, bottle brushes (Callistemon) boronia of various types, wild daphne (Brachyloma daphnoides) dogwood (Jacksonia scoparia) dead finish (Cassinia) geebung (Persoonia) five corners (Styphelia) ten corners (Astroloma) honeysuckle (Banksia) flannel flowers (Actinotus) christmas bells (Blandfordia) hickory (Acacia pennenervis) other wattles (A.nereifolia, A. longifolia, A rubida, A. stricta, A.fimbriata, A. falcata, A.decurrens, A. dealbata, A.longifolia, A.myrtifolia etc.). No rare varieties occur on proposed mine sites.

These and many other types grow together on this class of granite, all bearing a more or less stunted appearance, but crowded together so closely as to make cross country riding very difficult."

Fauna consists in the main of kangaroos and wallabies, ranging over wide areas of undisturbed bushland, including about 800 square kms. of the Mole Granite, in addition to very large areas of Great Dividing Range forests and reserves. Possums, small native marsupials, snakes and lizards also co-exist. Common birds of the granite with no special habitat within the lease application are widespread. Feral pigs are an increasing problem. There are no known endangered species within the area. All native animals and birds are common species.

4.2. In summary, the land scape is not unique in any way, and is no different from that available within State Forests and reserves of many thousands of square kilometres in various locations in New England.

4.3. The climate is mild in summer, and very cold throughout the winter months, with severe frosts from April to August and longer. The area is at an elevation of from 1000m to 1300 metres above sea level. Rainfall is about 700 mm or higher, with 42% falling in the December to February period. Wind velocities are always moderate, with stronger gusting from westerlies in August, and local squalls during thunderstorms in the summer.

The nearest settlement is the village of Torrington, about 15kms to the south east of the application., - no dust nuisance is possible.

4.4 There are no areas of cultural, historical, recreational, scientific, social, aesthetic or conservation interest in the region, which could be effected by the proposed development; in contrast, the science of geology and of metallurgy will be advanced by the project, including the commercial benefits of new technology arising from original research initiated by the applicant company.

Environmental interactions.

5.1. No interactions between the proposed activity and the environment are envisaged. Treatment of ore rock is to be by simple, gravity milling methods, with no chemical additives to the mill water. Minimum disturbance of native flora, except for growth immediately above ore bodies, and subject to reinstatement under Ministerial direction. Minimum disturbance of wildlife; bird and animal populations have accepted our previous similar activities, and continue to feed and breed normally in communities adjacent to mill and mines.

The closest settlement is Torrington, about 15 kms distant, with a small population of miners; Deepwater and Emmaville are the nearest townships with a few hundred population, about 50 kms distant.

The area of the application is about 140 hectares, compared with a total area of the Mole Granite of 800 squ. kms, available to

5.1 (continued)

interested parties such as bush walkers, fossickers, bird watchers etc., without restriction, where wildlife exists in the natural state and flora is identical with the subject area. Many greater areas of similar and superior granite country exist in the New England region, with public access.

Environmental impacts.

6.1. No negative impacts are likely. The area is remote from settled centres of population as detailed. Minimal disturbance of fauna, presently occupying hundreds of sq.kms of identical country, without restriction. No localised flora or fauna concentrations exist, either on or adjacent to the area of application. No adverse effect on access to the overall area, or the Torrington State Forest, in fact access will be improved for management and tourism.

The mining and milling procedures will be contained within the application area, with no usage of public roads or facilities.

Water conservation will be established in permanent dams, for the first time. Energy requirements will be provided by applicant's own diesel power units, or connected to the existing North West County Council high voltage feeder line, established by the Pacific Copper - Ashford joint venture on adjacent properties.

All impacts are therefore advantageous and positive.

There is no public use of area of application or environs at present, therefore visual impact is not applicable, although rehabilitation will return worked areas to almost original status progressively.

Dust control is to be controlled under health and comfort provisions of the various Acts for the good of the workforce.

6.1 (continued)

24

Runoff has not been a problem on adjacent similar operations, as water accumulates in pits during extraction, and either drains away slowly through rock crevices or rock porosity to depth, or is pumped out under controlled conditions through pipelines to settling dams on site.

The area is an elevated zone of the Mole Granite, with little natural runoff due to limited catchment area, therefore erosion is not a problem, and is easily controlled by normal pit management methods. No extraction is planned within natural watercourses.

No discharge of tailings or mill water is to be made into any water course, as the milling operations are contained within a closed circuit system of supply and settling dams, incorporating mill water reclaim.

Noise levels are limited to low level blasting during daylight hours only, once daily, and weekdays only. Limited milling noise which emanates from the crushers of a similar size at the Bismuth mill of the joint venture, is carried on a still day as an audible mechanical operation no further than three kms from that mill; the closest private dwelling is more than seven kms. distant from the application area.

No haulage or loading or earthmoving noise will be heard outside the application area boundaries.

All waste as mill tailings will be stacked and held for future sale or re-treatment as markets are developed for extractable or converted products. Overburden will be stacked adjacent to each pit, and consolidated with low, safe batter angles under the Minister's direction. Natural regrowth forms a permanent erosion control mat within a few months of stacking, and shaping. Topsoil is returned progressively to each extraction site.

No exotic plant species will be introduced, or allowed to become established; we are very familiar with local species, and no existing

threat is known in the district.

Justification.

7.1. There are no unfavourable environmental considerations; there are positive considerations as detailed in section 6, including construction of an all-weather access road through adjacent private property.

7.2. The Torrington area, including the Torrington Pendant structure, portion of which is included in the application area, is established as an important mineralised zone, having produced considerable tonnage of wolfram and tin concentrates since about 1912 ; new technology in mineral separation processes now make the area potentially viable as a long term and continuous producer of these metals, plus other co-product materials of industrial importance, and minor metals and minerals not previously recovered for sale. Original research by our company principals will be applied to the recovery of these minor but valuable components.

Secondary processing of the raw concentrates is planned, to reduce the cost of foreign imports into Australia, and to increase the value of excess production for export, thus strengthening the financial base of the project, and assisting with the balance of payments problem.

Market establishment for co-product topaz and/or high alumina refractory products, including high quality mullite as anticipated by The Geological Survey Branch staff, will create a totally new resource within New South Wales, not previously recognised, which will not only raise royalty income for the state, but also allow for the development of the low grade wolfram orebodies which are uneconomic. This in turn reduces dependence on supplies from Communist China, which has held the major world reserves of this important metal for the last sixty years, effectively controlling the market for the commodity.

7.2. The development of this project will generate employment and aid support industries in the district, which has suffered in the overall decline in economic activity in rural and mining areas.

The provision of new employment opportunities close to homes of workers and their families, will strengthen local communities; many workers will otherwise be forced to leave the district, seeking employment elsewhere with concomitant disruption to family welfare, or else remain on the social services system.

Measures to protect environment.

8.1 All conditions included in the schedules attached to your letter of 2nd April 1979 will be faithfully observed, together with any further requirements which may be added thereto; these measures will be effective in protection of the environment.

Clearing of native trees will be kept to an absolute minimum, essential for proper development of the project; any useful timber felled will be preserved, or used in the project, and Forestry Commission regulations complied with.

All requirements of the Water Resources Commission and Pollution Control Commission will be observed to the letter. Erosion is not a problem in the area, as water run-off is minimal in view of the juvenile character of the water courses.

Re-establishment of flora is very easy to achieve in this area of good rainfall and soil fertility, by following the methods proven by experience.

During the past thirty years of activity in the mining industry in the New England district by principals of Athol Ashford Pty.Ltd., conservation and protection of the environment has always been of paramount importance, and will continue to be so; if the lease

application is granted, this attitude will be maintained in preserving both the environment and our good record established over many years with your Department and other relevant authorities.

Alternatives.

9.1. No feasible alternative is available, due to the nature of the orebodies, which are generally flat lying, sill structures with clay and sedimentary rock intercalated layers of varying thickness, and of irregular and broken habit. Due to these characteristics, and the high cost of mining and milling the ore rock, costs can only be contained at an economic level by the use of open pit extraction; this is also the most efficient method to reduce wastage at the mine face.

Due to the broken nature of the orebodies, open pit mining methods are the safest, as compared with underground extraction.

The ore grades are generally very low in metallic values, requiring fine crushing for maximum liberation of all components, including topaz, and the abrasive nature of the gangue causes high wear rates.

The ore is amenable to a simple gravity milling process, with no chemical additives to the mill water at any stage, therefore no alternative is necessary.

Consequences of not carrying out the proposed activity.

10.1 If the application is not granted there will be complete failure of the projected commercial development as an independent operation, not under the influence of other corporations, and which will include the participation of local miners and contractors at an equity level and/or profit sharing basis. It will also mean the loss of many years concerted effort in the investigation and feasibility study of the project, together with the expenditure of several hundred thousand dollars in cash.

Pollution Control Commission

11.1 There will be a responsibility for the applicant company under section 17 of the Pollution Control Act and Regulations, and therefore approval will be obtained for the dam system from that authority, prior to commencement of operations. No air or noise pollution control regulations are applicable.

National Parks & Wildlife Service.

12.1 The application is included in the management zone of the proposed Binghi Wilderness area, but will not have any conceivable effect on that proposal, either in the short or long term.

This commercially mineralised area should not be included in any future national park or reserve, as the extraction, under controlled conditions, of substantial mineral reserves is essential for the benefit of the State and its people, in assisting to maintain or improve the standard of living. There are many thousand^s of square kilometres of barren granite with identical and superior qualities of landscape, flora and fauna resources, available to the public throughout the length of the Great Dividing Range traversing the State.

However, we have consulted with the Glen Innes office of the Service, and the senior ranger by telephone, who has advised us of the current status of the Binghi proposal, and the extent of the Service's interest in this application and its outcome.

12.2. There are no known aboriginal relics or places within the area or district, and the senior ranger does not deem an Archaeologist survey; ^{necessary} the Service will carry out its own inspection in due course.

12.3 ENERGY STATEMENT.

Total energy requirement is 455 kilowatts maximum.

To be provided by diesel generating sets, 3 phase, 415 volt A.C.

Conservation of energy will be maximised by appropriate choice of electric motors to match manufacturers' specifications for individual machines, as to both kilowatt rating and power factor type match.

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ATHOL ASHFORD PTY.LIMITED.



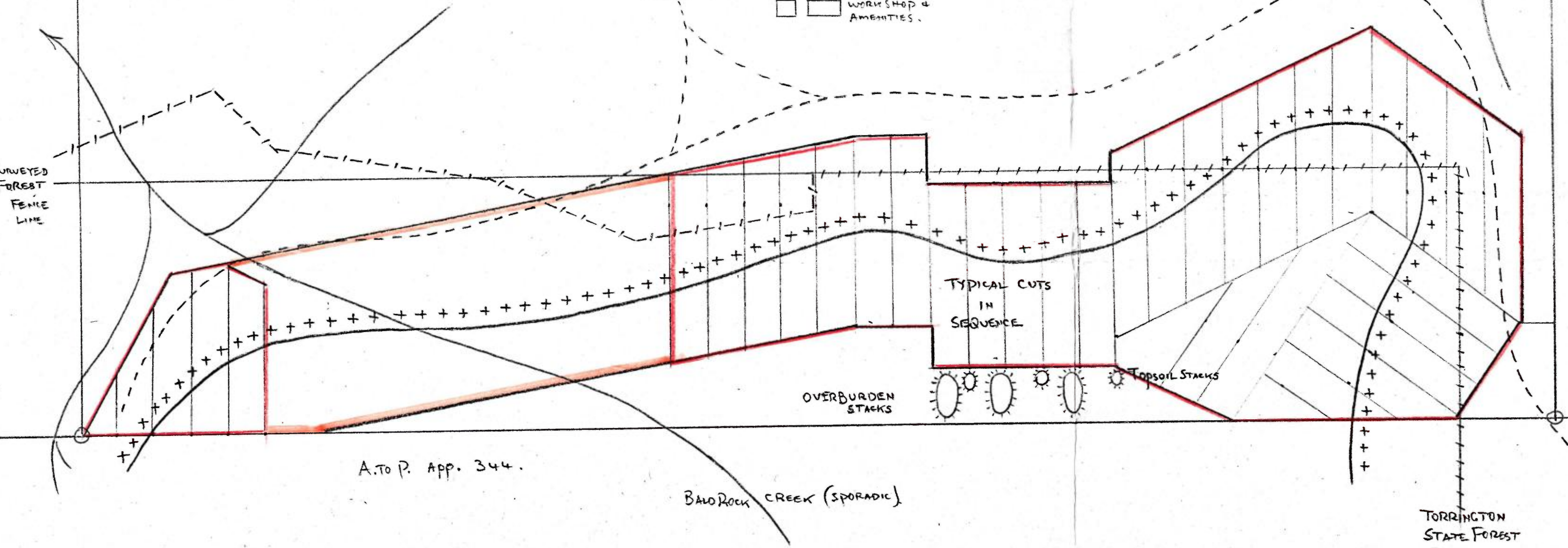
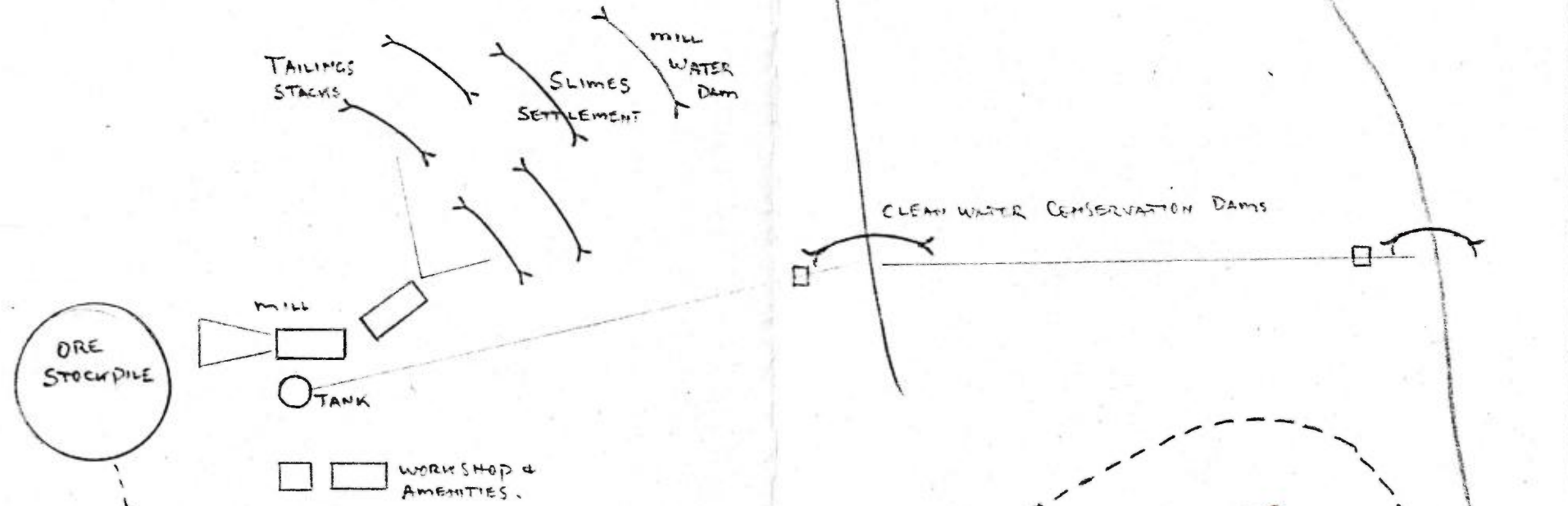
(G.A.Shepherdly Jnr.)

Managing director.

TENTERFIELD SHIRE. PARISH ROCKVALE. CO. CLIVE

M.L.A. 51. BOUNDARY

M.N.



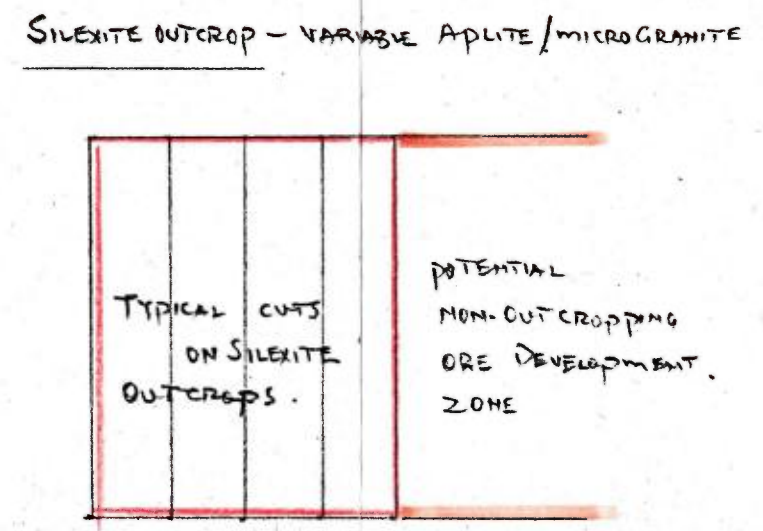
POR. 4

NEAREST RESIDENCE APPROX. 7 kms TO SOUTH EAST.

- LEGEND**
- +++++ - GRANITE-METASEDIMENT CONTACT
 - |-|-|-|-| - FENCE
 - - - - - - - ROAD - PROPOSED
 - ~~~~~ CREEK OR DRAINAGE GULLY (SPORADIC)

VEGETATION

ROUGH EUCALYPT SCRUB - SOME STRINGY BARK, APPLE GUM, AND PEPPERMINT, WITH MINOR BLACK PINE AND BANYSIA.



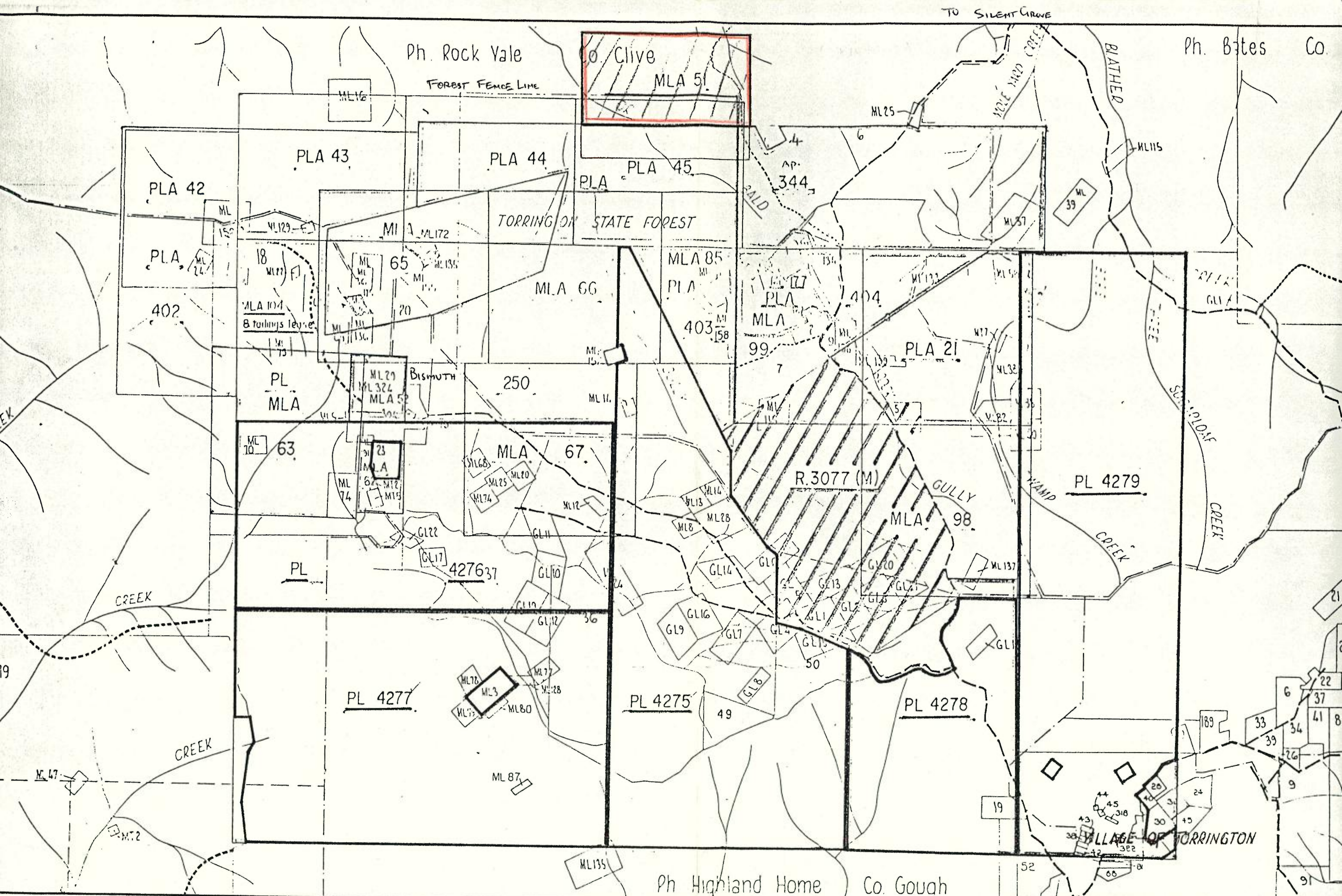
APPENDIX 2

MINING PLAN - MILL SITE.

SCALE 1:4000

M.L.A. 51 INVERELL

ATHOL ASHFORD PTY. LIMITED.



LEGEND

- - - ROAD
- - - TRACK
- ~ CREEK

APPENDIX 1.

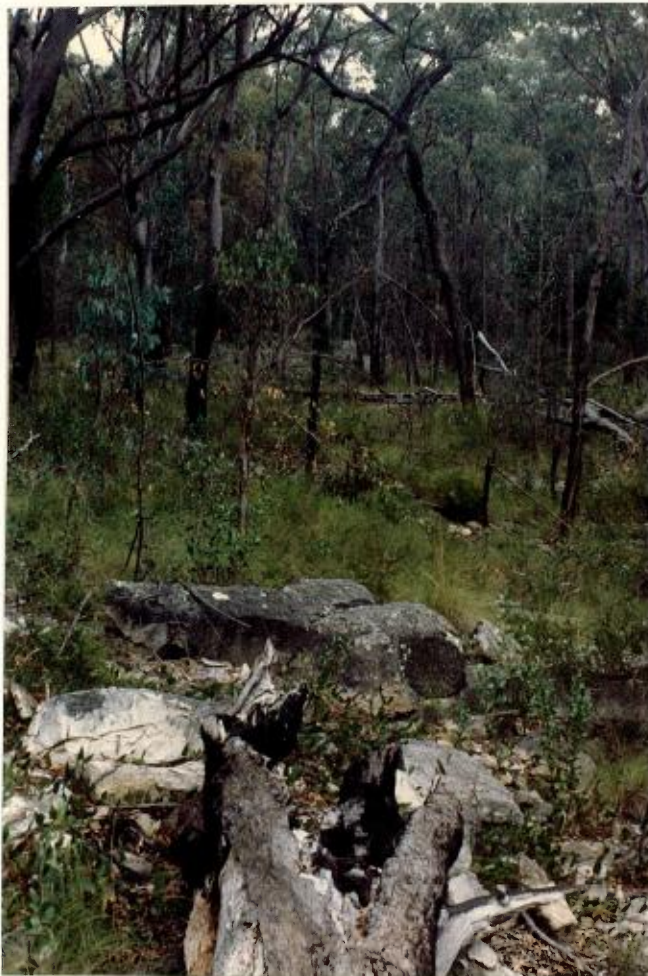
ATHOL ASHFORD PTY. LIMITED.

LOCALITY PLAN M.L.A. 51
(IMVRELL)
TORRINGTON PROJECT
SCALE 1:31 680

APPENDIX 3



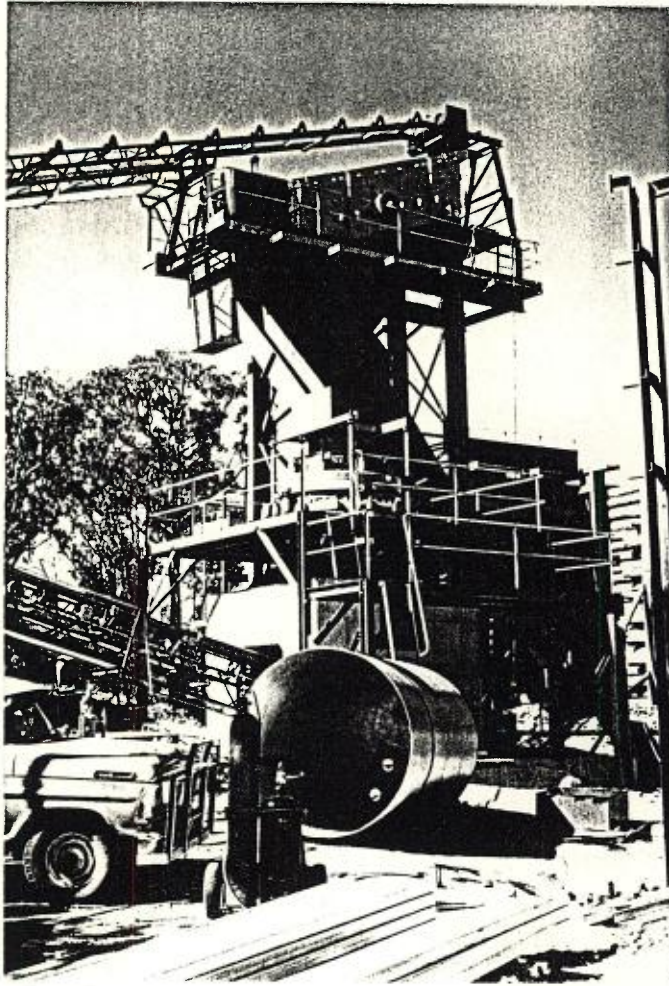
GRANITE - SILEXITE CONTACT ZONE



TYPICAL VEGETATION - FLORA,
LEASE APPLICATION AREA



SILEXITE OUTCROP
(TYPICAL)



BISMUTH MILL DURING CONSTRUCTION.

SIMILAR EQUIPMENT AND LAYOUT
TO PROPOSED MILL ON MLA 51.

