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## The Current State of Wood Preservative Treatments in Vanuatu and Training Needs

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Prepared for  
Hassall & Associates

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MARGULES PÖYRY PTY LTD

Ken Groves  
SENIOR CONSULTANT

15 December 1997

## Summary

There has been serious concern among customers for treated wood in Vanuatu about the current state of wood preservation and methods of treatment of non-durable sawn timber.

Five functioning pressure treatment plants were visited; three at Luganville, Santo and two near Port Vila, Efate. Whitewood and milktree are the only two species treated.

Only one of these plants was using charge sheets, as a quality control procedure, and only one (another one) was in satisfactory mechanical and environmental condition.

There is no systematic control of treatment exercised and plant operators and suppliers of treated timber have no idea of retentions and penetrations achieved.

Wood was said to be treated as green as possible based on the claim that, contrary to normal practice elsewhere, using the Bethell process, that this is the most effective way of doing so. However, moisture contents are not checked as a normal part of pre-treatment procedures. On site tests by the investigators of timber proposed for treatment, using a resistance type moisture meter, gave moisture contents of from 16 to well over 40%. The highest moisture contents could not be determined since moisture meters are very inaccurate at high moisture contents, but are probably between 80 and 90%.

Recommendations have been made to improve the situation with respect to the timber treatment industry in Vanuatu including proposals for training courses and for certification of approved operators which should form the basis of a legally enforceable licensing system.

## Glossary

VSFUP	Vanuatu Sustainable Forest Utilisation Project
Margules	Margules Pöyry Pty Ltd
DOF	Department of Forests
CCA	copper chrome arsenic
H2	Hazard 2 level of Preservative Treatment (Australian Standard)
ANU	Australian National University
d.s.e.	dry salt equivalent
Melcoffee	Melcoffee Sawmills
SVT	Santo Veneers & Timbers
SRT	Side River Timbers

# 1. Introduction

There has been serious concern among customers for treated wood in Vanuatu about the current state of wood preservation and methods of treatment of non-durable sawn timber of whitewood (*Endospermum medullosum* and milk tree (*Antiaris toxicaria*).

On site investigations of 4 treatment plants on Santo, one of which has not been used for some years, was conducted by Mark Kalotap, DOF, Vanuatu and Ken Groves of Margules Pöyry Pty Ltd (Margules) of Canberra, Australia on Thursday and Friday December 4 and 5, 1997. On site investigations of 2 treatment plants on Efate were conducted by David Wood, Project Manager of the Vanuatu Sustainable Forest Utilisation Project (VSFUP), Adam Gerrand, Principal Forest Utilisation Officer of DOF, Mark Kalotap and Ken Groves on Monday and Tuesday 8 and 9 December 1997.

The purpose of these visits, apart from inspecting treatment plants, was to ascertain the views of each of the companies treating timber as the value of putting on a training course in wood preservation, how such a course should be structured and how many people each company would make available to attend the course. This course would be intended for plant operators only. However, a joint course in basic wood technology, as it applies to treated timber, to be attended by plant operators, and suppliers and users of treated timber is also proposed.

The first four treatment plants are all located at Luganville, Espiritu Santo and effectively belong to the following companies:

1. Melcoffee Sawmills (Melcoffee)
2. Santo Joinery
3. Side River Timbers (SRT)
4. Santo Veneers & Timbers.

The other 2 treatment plants are located near Port Vila on Efate and are owned by P.I.T.T. and Local Timbers respectively.

All but one of the treatment plants are fixed installations. Santo Joinery's much smaller mobile plant has not functioned for some years, after being loaned by the Department of Forests to Santo Joinery, and could not be used now without virtually rebuilding the entire plant. It is recommended this plant should be written off.

## 2. Melcoffee Sawmill Treatment Plant

Melcoffee processes whitewood almost entirely and pressure treats the green sawn timbers produced either with Immutan® (a mixture of sodium borate and boric acid to protect against attack by insects such as Lyctus beetles) or Tanalith® (a copper chrome arsenic (CCA) formulation which can be effective against insects, including termites, and fungal decay organisms).

Neil Croucher, of Melcoffee believes that whitewood and milktree must be treated green, preferably within 3 to 21 days of felling even when using, as he claims, a standard Bethell process of vacuum - pressure - vacuum.

This is contrary to accepted practice but the belief is supported by S.R. Kashyap, Regional Manager of Hicksons (Fiji) and Jeanette Drysdale of Hicksons (New Zealand), according to Neil Croucher

The belief that whitewood and milktree can be treated green seems to be based on two premises:

- 2.1. Both species must be treated as soon as possible after felling to avoid blue stain and mould formation which can occur one week after felling in the most favourable weather conditions of warmth and high humidity.
- 2.2. At a green moisture content of between 80 and 90% it is possible to impregnate whitewood and milktree with 300 to 400 litres of treatment solution per m<sup>3</sup> of wood and that this is satisfactory for the Hazard 2 (H2) level of treatment most in demand.

With regard to 2.1, Melcoffee does not have undercover storage for green sawn timber which is constantly exposed to the weather until it is treated and subsequently kiln dried. Thus the argument for treating the timbers green may in reality be more economic than technical, i.e. if ultimately the sawn timber must be pressure treated to meet customer requirements (and expectation of service life) it might as well be treated at the beginning to avoid an additional preliminary dip treatment simply to control blue stain and mould.

In reality, the moisture content of the wood is likely to be very variable since both whitewood and milktree dry fairly quickly. It would not take too many days of hot sun and strong breezes to bring the moisture content down to 30%. This, in fact, may be a source of some of the treatment problems i.e. that the moisture content of wood going into a treatment cylinder is very variable. Some of it has been exposed to the weather whilst other pieces have received some degree of protection. This situation applies not only to Melcoffee but to all other treatment plants in Vanuatu as well.

With regard to 2.2. assuming an average moisture content of 85%, on average basic density for whitewood of 361 kg/m<sup>3</sup> (milktree is even lower) and an average increase in water content during treatment of 350 litre per m<sup>3</sup> of wood,

- then the treatment would have the effect of increasing the moisture content of the wood to 182%. The method of calculation is given in Appendix 1.

A moisture content of 182% is theoretically possible in whitewood. Santo Veneers and Timbers (SVT) do, in fact, air season in a drying shed before treatment after a preliminary treatment with Immutan and Anti-blu 246 (Section 3). Anti-blu 246 is an anti-sapstain chemical consisting of a mixture of 450 g/l of chlorothalonil and 100 g/l of carbendazim. Anti-blu 246 is a very expensive formulation but combined with air seasoning in a properly constructed drying shed is also very effective.

Since treating green sawn timbers by the Bethell process is not normally recommended and since there have been misgivings and accusations about treatment levels and extent of penetration achieved we would recommend that trials should be conducted to ascertain if whitewood or milktree can be treated green effectively. Appendix 2 gives details of how these trials should be conducted at the Wood Science Section of the ANU Department of Forestry. Staff of the Wood Science Section are accustomed to carrying out trials such as these; they have all the necessary facilities and the entire operation can be most readily supervised by VSFUP personnel.

The treatment plant was not operating at the time of the visit; however the general level of maintenance and condition of pumps, mixing and work tanks seemed to be satisfactory as far as could be judged, with one serious exception.

The containment bund was not doing its job of preventing the spread of toxic chemicals. Water borne preservative had escaped from the bund and had formed a small pond adjacent to a drainage channel leading to the sea and thus contaminating the site in the immediate vicinity of the plant. In this context Neil Croucher believes that DOF has no official control over his treatment activities since the plant is designated an industrial site under authority vested in the Department of Labour. This situation became confused when he claimed that Department of Trade and Industry was also involved and had some sort of official authority.

Neil Croucher claimed that the treatment plant operator was well trained and had an adequate level of education (Standard 13) for the operational and quality control procedures involved. He does not believe he needs any further help with training from VSFUP training programs, insisting that, if assistance should be required, it will be provided by Hicksons which, he claims, have given him this kind of assistance in the past.

We were unwilling to pursue the matter further, deeming that to antagonise Neil Croucher would be counter-productive. However both investigators are concerned about the level of protection conferred by treating green timbers; hence the trials recommended above. We would further recommend that Hicksons are contacted, requesting details of specific training programs which they have provided to Melcoffee. Appendix 3 contains a suggested letter to be addressed to both Hicksons (Fiji) and Hicksons (New Zealand). The letter also

2 seeks information at both a commercial and research level regarding the treatment of green whitewood and milktree. We recommend the letter should come from DOF not VSFUP.

### 3. Santo Joinery Treatment Plant

Santo Joinery has a small mobile treatment plant on loan from DOF which has never been used and which Bradley Wood, part owner of Santo Joinery, says the company has no intention of using in the future. We recommend the plant should be scrapped since it will cost as much to bring it back into safe operating condition as buying a new one.

Santo Joinery has used treated whitewood in the past, purchased from a local supplier, but no longer does so because of poor treatment standards and cost of purchase. However it has become an important user of imported Fiji pine (*Pinus caribaea var. hondurensis*) through its low cost housing program. Bradley Wood claims that using a CCA formulation, Fiji pine is properly treated and branded to appropriate Australian hazard levels for the end use required of it and that it is in fact, as cheap to buy as locally produced treated whitewood.

He also pointed out that he orders "cut to length" for all his supplies of treated Fiji pine so that subsequent sawing and machining is reduced to a minimum; thus risk of exposing untreated wood is also reduced to a minimum.

A subsequent inspection of a "Santo Joinery" house in course of construction supported Bradley Wood claims of the quality, finish, dimensional accuracy and level of treatment of Fiji pine as far as could be judged by observation only. Sawn exposed end sections, which were few, indicated that penetration was excellent and whilst retention cannot be precisely estimated by eye the "CCA colour" was dark green and uniform throughout.

A subsequent inspection of a nearby, recently completed house by another builder suggested that the exposed end bevels on the rafters, which could be clearly seen and were of treated whitewood, were not adequately treated. There was no evidence of a green colour in these small exposed bevels and only a minimum envelope thickness at the edges.

Since Santo Joinery is not intending to treat its own timber in the future it has no specific training requirements in this area. However, particularly through its low cost housing program, it does have a vital interest in using properly treated timber. Maintaining the integrity of structural timbers is not only important for long term survival of a building but can also be important in the relatively short term. Any failures, even localised ones, could become critical in cyclones. It was noted that long steel rods with nuts at either end had been used for connecting the top and bottom plates in the "Santo Joinery" house, thus effectively tying the roof down to the foundation. Holes had to be drilled into the plates, which are made of wood, into which the rods could be inserted. Properly treated wood ensures that no decay is likely to occur in the holes. Improperly treated wood, however, is a real risk.

#### 4.

### Side River Timbers Treatment Plant (Forest Products and Plywood Site)

Forest Products and Plywood has gone out of business as it was originally set up. However, the treatment plant has been taken over by Bob Houston as Side River Timbers (SRT). He is using it to treat whitewood timber with CCA for the local market.

All wood is purchased from ni-Vanuatu mobile sawmillers and whilst surface finish and inherent wood quality is satisfactory, dimensional accuracy is extremely poor. Furthermore, because of delays in delivery, wood commonly arrives at the treatment plant with blue stain and black mould. Neither of these are critical defects in the local market and are arrested by subsequent treatment.

Wood is, in theory, treated green or nearly green as soon as possible after arrival at the treatment plant, using the Bethell process. Reject wood is not treated and is disposed of directly to the local market.

The treatment plant is in a decrepit state. The work tanks may be leaking and Bob Houston stated that because of the condition of the tanks only one preservative, i.e. CCA, is used. It has probably received no proper maintenance for sometime, apart from that which was necessary to start it up again.

After treatment, the timber is air dried in an open sided shed with much of its roof collapsing and which, during heavy rain, must direct sheets of water on to the stacks of treated timber under the roof.

Some pools of water have also collected around the yard, sufficiently stagnant that encounters with mosquitoes were common. Some of the pools must contain CCA since there is no post treatment drainage pad within the bund and site contamination must be a problem.

SRT had a refractometer, an instrument which can be used to estimate solution strength. However, there was no evidence that it was being used for routine testing. We used it and found the solution strength to be 1.5% which is adequate for treating whitewood to Hazard 2 level assuming retention and penetration is adequate. We would doubt that an accuracy greater than + 0.05% could be achieved with the refractometer and its use should not be regarded as a complete substitute for hydrometer, thermometer, glass cylinder and a set of tables for determining solution strength.

A charge sheet dated 18 November 1991 was produced, indicating that at that time some quality control was being exercised. At present no charge sheets are being completed as records of treatment.

Analysis of the charge sheet shows the following:

Required retention of CCA for H2 level of protection (d.s.e. = dry salt equivalent)	=	3.5 kg of d.s.e./m <sup>3</sup> of wood
Assuming a solution strength of 1.5% the net absorption of treatment solution required for H2 treatment	=	233 l/m <sup>3</sup> of wood
Actual solution strength, as given on the charge sheet (based on a hydrometer reading of specific gravity of 1.0133 at 25°C)	=	1.86%
Actual green volume of wood treated	=	4.8 m <sup>3</sup>
Net absorption	=	2100 l or 39.06 kg of d.s.e.
Therefore, net absorption per m <sup>3</sup>	=	8.14 kg

Assuming all work tank levels were read correctly then the wood was substantially over treated for H2 level, i.e. on average by 132%.

It should be noted that the wood was recorded as being dry prior to treatment. The actual moisture content is not given but it must have been well below fibre saturation point since total volumetric swelling during treatment, estimated from the charge sheet data, was 14.3%. This seems extraordinarily high for whitewood which would have an average volumetric swelling from air dry to green of about 6% based on data from the Timber Properties Booklet of the VSFUP (Table 4-1 in the Booklet). It is difficult to explain the discrepancy except perhaps that the work tank levels were not read and transcribed to the charge sheets correctly.

Bob Houston signified that he was agreeable to nominating two of his employees for a training course in wood preservation procedures and practices on condition that he was not involved in any expense.

## 5. Santo Veneers & Timbers Treatment Plant

Santo Veneers & Timbers (SVT) carries out two types of treatment. These are:

### 5.1 Dip Diffusion Treatment

Treatment by dip diffusion of green sawn timber of whitewood and milktree is by a mixture of two proprietary brands Immutan® and Anti-blu 246®.

Immutan is an outdated inorganic water borne preservative, replaced elsewhere by Diffusol®. Immutan consists mainly of sodium borate and boric acid and is used as a protection against insect attack; in particular by Lyctus beetles. These will attack the sapwood of susceptible species such as whitewood and milktree dried to between 8 and 25% moisture content reducing it to a fine powdery frass. Boron compounds can confer some protection against blue stain fungus; however Immutan is not very effective for this since it does not contain a high enough proportion of boric acid. Hence SVT also use Anti-blu.

Anti-blu 246 is an organic water borne suspension concentrate consisting of chlorothalonil and carbendazim which is used, as its brand name suggests, to protect wood from attack by blue stain fungus as it seasons. Whilst blue stain fungus feeds on starches in the lumina of wood and does not attack the wood substance itself, hence does not reduce the structural integrity of the wood, it is unsightly so that, for appearance grades of sawn timber, it is unacceptable. Anti-blu 246 doesn't readily diffuse into wood since it doesn't form a solution but rather a suspension which effectively coats the outside of the wood and kills the spores of the fungus at the surface of the wood. Thus, if spores have already penetrated the wood before treatment, Anti-blu 246 will not be effective if conditions for fungal development are present.

Timber treated by dip diffusion is ideally block stacked for a few days to allow the chemicals to penetrate the wood as much as possible. It can then be stripped out for kiln drying, air drying or a combination of both. SVT has excellent drying facilities; modern kilns and a large spacious air drying shed. The drying stacks are well constructed and aligned parallel to the prevailing wind to achieve maximum possible air drying rate. Under these conditions dip diffusion seems to be effective since there is no danger of leaching or washing away of the Anti-blu 246 from the surface of the wood. Seasoned timber which has received dip diffusion treatment is exported to Korea, Japan and Taiwan. It receives no further treatment.

## 5.2 Pressure Treatment

SVT treats green sawn whitewood with CCA only for the local market using a Bethell vacuum pressure vacuum process. Since the timber is only for the local market there is no concern for blue stain fungus.

In general quality control would seem to be ignored. The last charge sheets available are for a short period in May 1990 since which time they have not been used. The treatment plant operator seems to have been issued with a series of instructions which are designed to speed up the treatment process, e.g. a pressure phase of only 15 minutes when previously it was about 90 minutes which the operator says he knows to be very satisfactory.

The SVT charge sheets are a little puzzling. The sawn timber is said to be all green but this seems unlikely since in the main there are significant differences between *Displacement Volume In* and *Displacement Volume Out* which is a measure of the initial volume of the charge before treatment and its final volume after treatment respectively. If the wood was truly green these two volumes should be virtually the same. In general, however, the wood has swollen during treatment by between 2 and 5%, suggesting the wood must have been at least partly below fibre saturation point (i.e. about 30% moisture content) before treatment. By default, the timber may have been at a sufficient moisture content to ensure more than adequate uptake of preservative in all cases except one. There are however, 4 major discrepancies in 21 charges; two in which the imputed swelling would seem to be far too high and two in which shrinkage seems to have occurred!

In general, the condition of the treatment plant was worse than any other part of the mill and it seems likely only the barest maintenance is carried out. However, the containment bunds were quite good except there was no drip pad and the sump was full of preservative solution. The plant operator was even able to bring out an hydrometer, thermometer, pipette and glass cylinder for determining specific gravity but told us they were not being used.

SVT agreed that 2 of their employees should receive training in wood preservation.

## 6. PITT Ltd Treatment Plant

PITT has a sawmill, cutting mostly whitewood, has no kiln drying facilities but has a CCA pressure treatment plant which operates infrequently as the market demands.

The treatment cylinder was about to be loaded on our arrival. However, the operation was very clumsy, using a front-end loader to push the charge into the cylinder, in the process damaging the metal door ring. This was repaired; however, loading the cylinder had also damaged a relief valve so that it remained permanently open! This was repaired after we left and the charge was then treated.

The plant generally was in poor condition, but obviously functions. The sump was full of liquid and there was evidence of spillage and contamination of soil. Charge sheets are still kept and it was claimed that solution strength was maintained using a refractometer. However, the wood is block stacked (according to orders received) in the full sun for unknown periods so that there are likely to be significant variations in moisture content. These were, in fact, checked for wood that was intended for pressure treatment and moisture content varied from about 21% to well off the top of the scale at 40% to probably between 80 and 90% since this is the moisture content of freshly cut whitewood.

The Manager of PITT agreed to provide at least one of his employees for training.

## 7. Local Timbers Treatment Plant

This CCA pressure treatment plant used wood supplied by small mobile mills on Efate. The plant was in good condition; the sump was dry, it had the only well constructed drip pad seen in Vanuatu and the operator seemed to know what he was doing. However, he had stopped keeping charge sheets and he only held the pressure phase for about 15 minutes. He claimed to keep the solution strength between 3 and 5%, but when we checked it using the operator's refractometer, it was 2.2%.

We checked the moisture content of sawn timber to be pressure treated. Again, there was significant variation (as for PITT); one moisture content being recorded at 16%.

Since this treatment plant was in such good condition, we would recommend that it should be used as a training centre. We would also recommend, if possible, that some trials be conducted at this plant. We would suggest that a number of pieces of the same section size should have their initial moisture contents checked in a systematic pattern using a resistance type moisture meter, i.e. the moisture content should be read at 3 different depths; e.g. just below the surface, one-quarter across the thickness and half-way across the thickness at the mid point along the length. Each sample would be weighed before and after treatment, and the solution strength determined (before treatment). The samples would be placed on top of a normal charge and strapped in position. From the above, it would be possible to determine retention of preservative in each piece and if a wide enough range of moisture contents had been sampled, it should be possible to ascertain if there was any correlation between initial moisture and retention. Such trials could begin immediately if a suitable weighing machine can be located or purchased.

Local Timbers agreed that their plant operator should attend the proposed training course.

## 8. Conclusions and Recommendations

Neil Croucher resents what he perceives as interference by the Department of Forests in his milling operations and questions its legal authority to do so.

Hicksons have told him that treating green sawn timber of whitewood and milktree is satisfactory and he intends to continue doing this. Again he resents the suggestion that he is not treating timber adequately. He did not provide us with any up-to-date charge sheets to convince us of this.

### Recommendation 1

We recommend that trials should be conducted at the ANU Department of Forestry (Appendix 2) to settle this issue and that Mark Kalotap should participate in these trials as part of his detailed training in pressure treatment of timber with water borne preservatives (see Recommendation 6).

### Recommendation 2

At the same time we recommend that Hicksons (Fiji) and Hicksons (New Zealand) should be approached by letter from the Department of Forests (See Appendix 3) asking for information on treating green sawn timber of whitewood and milktree showing that this is satisfactory both in terms of retention and penetration.

### Recommendation 3

A letter should be sent to Neil Croucher by the Department of Forests requesting photocopies of all charge sheets for November 1997. If his assertion that he is treating timber adequately is correct he should be willing to do this. The charge sheets should be checked by Mark Kalotap of Department of Forests and Ken Groves of Margules Pöyry Pty Ltd.

Santo Joinery is no longer using treated whitewood in house construction instead the company is importing treated pine from Fiji, in which it has complete confidence and which can be purchased in Vanuatu at a price competitive with the local product.

### Recommendation 4

Any government charges associated with imports of Fiji pine, other than those associated with cost recovery, should be removed as a contribution by the Government to the provision of low cost, durable housing in Vanuatu and to introduce international pricing to the domestic market.

Only one treatment plant, Local Timbers, is completing charge sheets as a record of their treatment operations.

### **Recommendation 5**

All companies should be requested immediately by the Department of Forests to reinstate the practice of completing charge sheets, making copies available to the Department of Forests on request. Mark Kalotap will provide any help necessary in reinstating this practice. The charge sheets must be checked by the Department of Forests and discrepancies clarified.

Only Melcoffee was unwilling to provide employees for training in wood preservation. About 6 to 8 plant operators could thus be involved.

### **Recommendation 6**

Initially a mostly classroom based training course in basic wood technology emphasising wood preservation should be provided which should be attended not only by the operators but also by suppliers, specifiers and users of treated timber. The second part of the training should be for plant operators only. It could be conducted at each site separately using the available facilities thus entailing no loss of production for participants. Alternatively, now that a treatment plant in good condition has been located, i.e. Local Timbers near Port Vila, it would be feasible to run a single course there. The optimum solution might be to conduct separate courses at each plant but when these courses are completed, and as part of the follow up, all participants should visit the Local Timbers treatment plant as a group. Hicksons should be asked to support the courses and may wish to participate. However they should only do so in an advisory capacity.

### **Recommendation 7**

After completing the course for plant operators, each successful operator should be awarded a certificate of competency. This certificate should form the basis of a licensing arrangement which can be enforced by the Department of Forests.

### **Recommendation 8**

To ensure the course provided will be useful, Mark Kalotap should spend at least three weeks in the ANU Department of Forestry, Wood Science Section operating the preservation plant and going through the operational quality control procedures necessary to produce charge sheets. This treatment plant, whilst not full commercial size, will exactly simulate a commercial operation using the Bethell Full cell process for treatment with a water borne preservative.

### **Recommendation 9**

On satisfactorily completing the training course at ANU, Mark Kalotap should spend at least 2 days at the Koppers commercial treatment plant where he will see computerised control of treatment and advanced environmental monitoring of the site.

#### **Recommendation 10**

Mark Kalotap and Ken Groves will prepare a site specific operational manual for each treatment plant

#### **Recommendation 11**

Since the treatment plants are generally in poor condition, Hicksons (Fiji) should be requested to visit each plant and prepare a brief report on the technical condition of each i.e. what needs to be done to bring each plant into safe and efficient operating condition.

## Increase in Moisture Content after Green Treatment of Whitewood

Initial moisture content	=	85%
Basic density of whitewood	=	361 kg/m <sup>3</sup>
Mass of water in 1 m <sup>3</sup> of whitewood at 85% moisture content	=	0.85 x 361 kg
= 306.85 kg		
Assuming 350 litres of water borne preservative contains 350 kgs of water then the total mass of water contained in 1 m <sup>3</sup> of green treated whitewood	=	(306.8+350) kg
= 656.85 kg		
Therefore, moisture content of green treated wood	=	182%

## Increase in Moisture Content after Treating Whitewood Dried to 28%

Initial moisture content	=	28%
Basic density of whitewood	=	361 kg/m <sup>3</sup>
Mass of water in 1 m <sup>3</sup> of whitewood at 28%	=	101.08 kg
Assuming 350 litres of water borne preservative is a satisfactory level of treatment and that the preservative solution provides an additional 350 kg of water for each m <sup>3</sup> of whitewood, then the total mass of water in 1 m <sup>3</sup> of treated wood	=	(101.08+350) kg
	=	451.08 kg
Therefore, moisture content of treated wood	=	125%.

## Treatment Trials of Whitewood or Milktree

- 5 pairs of edge matched back sawn samples of green sawn timber of the following dimensions should be prepared:

Length	2 m
Width	100 m
Thickness	50m

- The samples should be taken from 5 different trees the sawing pattern being as follows:

\*(Drawing to be inserted)

- Immediately after sawing each sample should be wrapped in film wrap followed by plastic sheet to prevent drying out and air freighted to the ANU Department of Forestry, Wood Science Section.
- 5 of the matched samples (1 from each tree) would be kiln dried to about 28% after removing the wrapping. This should take less than a week. Before kiln drying the 5 green samples should be weighed and measured as accurately as possible.
- On completing kiln drying to 28% all ten samples will be pressure treated at the same time, using the Bethell process and a standard CCA formulation as the preservative. Before treatment all samples will be weighed and measured.
- Total retention would be estimated using standard quality control procedures. However, total retention would also be determined for each individual sample from their weights before and after treatment.
- All ten samples would be kiln dried to 15% moisture content, after which total penetration with preservative would be determined using stains.
- A brief report would be prepared comparing retention levels and penetration.

## Proposed letter to Hicksons (Fiji) and Hicksons (New Zealand)

Dear \_\_\_\_\_

Concern has been expressed by end-users about the level of preservative treatment of non-durable Vanuatu timbers to such an extent that the Department of Forests is proposing to conduct a training program early next year with a view to overcoming this problem.

In this context, we have visited all commercial treatment plants all Luganville, Espiritu Santo and near Port Vila, Efate to ascertain training needs, as each company perceives them, in pressure treatment of whitewood (*Endospermum medullosum*) and milktree (*Antiaris toxicaria*).

Neil Croucher, of Melcoffee Sawmills Pty Ltd told us that he didn't have any training needs since your company provides him with all the training his treatment plant operators require and that you will continue to do so in the future.

We would be most grateful if you could provide us with the following information:

- Dates of training programs provided in pressure treatment to Melcoffee Sawmills Pty Ltd over the past 5 years.
- The names of Melcoffee plant operators involved in training programs and the dates on which they received their training.
- Details of the training program provided to Melcoffee Sawmills including preparation of wood for treatment; types of preservative treatment for which training was provided including operational procedures, operational levels for the vacuum-pressure-vacuum sequence and the time recommended for each; quality control procedures including mixing, estimate of solution strength and determination of retention and penetration; handling of treated timber prior to sale or further processing, environmental procedures including sludge disposal and disposal of solution caught in the bund or which has escaped outside the bund; operational safety procedures; any other matters dealt with in your training programs.

You will appreciate this will be most helpful to us in designing our own training program for other treatment plant operators in Vanuatu. Your cooperation will of course be formally recognised. Should you wish to be more directly associated with our proposed training program, we welcome your assistance.

A further matter for concern with regard to retention and penetration which has arisen as a result of our investigations is that whitewood and milktree are not being treated using standard Bethell full cell procedures i.e. the wood is treated green preferably within 3 to 21 days of felling and not dried to about 30% moisture content. Again, Neil Croucher has quoted Hicksons as the authority for this; indeed claiming that you have said that it is essential to treat whitewood in as green a condition as possible.

We would be most grateful if you could provide us with details of the reasons for this departure from normal Bethell procedures including copies of any relevant research reports, details of industrial level trials and copies of charge sheets in your possession which indicate that treatment of green whitewood and milktree is satisfactory to each hazard level of Australian standards. We are concerned not only with retention levels but also penetration so that details of the latter are also required. We should tell you that we are proposing to conduct our own research level trials using a

pilot study plant formerly owned and operated by Koppers Australia. However, we could be spared the perceived necessity for this if you can provide us with factual evidence of the efficacy of pressure treating green whitewood and milktree.

Thanking you in anticipation of your continuing cooperation in resolving what has become a matter of serious concern amongst end users of treated whitewood and milktree in Vanuatu.

Yours sincerely