



- **Proposed Changes to B2/AS1**
Report to Building Industry Authority

Attachment 1:

Report on Submissions in Response to the Proposed Changes to
Building Code Clauses E2 External Moisture
and B2 Durability

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A. GENERAL

1. Background

Following problems experienced in recent years by homeowners, the BIA commissioned an independent investigation in 2002, resulting in the *Report of the Overview Group on the Weathertightness of Buildings*, commonly known as the Hunn Report. This report included:

Recommendation 11

That the BIA:

a) develop more prescriptive Acceptable Solutions and Verification Methods for the Approved Documents B2 Durability and E2 Weathertightness;

Documents covering proposed changes to both clauses were prepared and released in June 2003 for industry and public comments. The closing date for comments from interested parties was 8 August 2003.

2. Submissions On Proposed Changes

A total of 304 submissions were received from all sectors of the building and timber industries, together with some from the public. Analysis of the occupations and professions of submitters gives the following breakdown:

TOTAL SUBMISSIONS			E2	B2
Forest owners, mills, suppliers etc	58	19%	25	58
Manufacturers	57	19%	51	19
Builders & other trades	49	16%	22	41
Architects/designers	30	10%	25	23
Territorial authorities & Certifiers	31	10%	24	23
Building Consultants	31	10%	24	20
Other interested parties (including Gov't)	21	7%	8	18
Public	16	5%	2	16
Engineers	11	4%	8	7
	304		189	225

B. COMMENTS ON B2

1. INTRODUCTION AND BACKGROUND

The report by the Government Administration Committee, *Inquiry into the Weathertightness of Buildings in New Zealand* (March 2003), included the recommendation that:

As a matter of urgency, the Building Industry conclude its revision of the current timber treatment provision within the Approved Solution B2/AS1 and determine new standards for the use of treated timber, especially for external framing. Any new standards must take into account associated health and environmental issues.

The proposed B2 changes released for public comment specifically relate to the use of treated timber under the Acceptable Solution. B2/AS1 relies on two NZ Standards to provide the detail

required. These are NZ 3602: *The Use of Timber and Wood Based Products* and NZ 3640: *Timber Preservation*, both of which are also currently being reviewed and are the subject of a separate consultation process being run by Standards New Zealand. These draft standards are called for in the proposed changes, with some modifications. The other key change is the proposed revisions to the “Durability Table” of B2/AS1.

2. OVERVIEW OF COMMENTS RECEIVED

There were a total of 752 comments from 225 commentators related to the proposed changes to B2. The following table shows those topics that were of most concern:

B2 Comments - subjects		
General	93	13%
Commentary	67	9%
Treatment	202	27%
Identification	83	11%
Durability table	86	11%
Alternate Option	41	5%
Chemical use	33	4%
Douglas Fir	136	18%
Other effects	11	2%
	752	

A number of comments on treatment were primarily focused on what some commentators saw as the effective exclusion of Douglas Fir framing that the proposed changes would cause. In the above table, such comments have been included under Douglas Fir in order to better reflect the level of interest in this topic.

Most comments included as General and Commentary covered points that were repeated under other subject areas, or were in regard to the scope of the changes and the process of consultation.

As shown, the main specific areas of concern were:

- ❑ *Treatment levels proposed*
- ❑ *Identification of treatments*
- ❑ *Durability table requirements*
- ❑ *Issues relating to Douglas fir*
- ❑ *Issues relating to chemical use*

The following summarises the main concerns and varying opinions expressed by commentators.

3. SCOPE AND GENERAL ISSUES

a) General issues and concerns

Many comments raised issues that were outside the control of the proposals, such as education, research, the consultation process, reasons for the current problems, problems associated with other parts of the Code, issues regarding the processing of Alternative Solutions, and various other matters beyond the scope of the Building Code.

b) Scope

Comments generally related to concerns that the Acceptable Solutions may be limited to smaller scale housing. Territorial Authorities suggested that this would lead to significant work in processing other types of buildings. There were suggestions that the scope should be expanded to cover all of those buildings that fall with NZS 3604, regardless of their use.

4. TREATMENT LEVELS

This was the particular issue that attracted the largest number of comments. Some commentators were fully in favour of the preferred option 1 (treatment of all timber), some totally disagreed, favouring option 2 (treatment for timber in external walls only) and others fell between those two extremes. Comments have been grouped according to the level of agreement with the proposal, and the results are shown below:

<i>In favour of proposed treatment (Option 1)</i>	11%
<i>In favour, but with reservations</i>	8%
<i>Compromise needed</i>	32%
<i>Treatment only for riskiest areas (Option 2)</i>	24%
<i>Against - keep status quo</i>	25%

It should be noted that, unless otherwise stated, this report refers to comments in relation to the preferred option given in the documents released for comment.

As can be seen, the majority of comments fall between the two extremes with varying degrees of compromise wanted by commentators. The main points raised by each group are as follows:

a) Those in favour

The proposed treatment levels are logical

- Treatment is a sensible precaution, for Auckland's climate in particular, and the cost of treatment is not high

The proposed treatment levels are simple

- The fewer types of timber on the building site the better. With one level of treatment for walls, the selection of timber is simplified with fewer choices and inspection is easier, with less chance of missing inappropriate use of untreated timber.
- If treatment is limited only to external frames, untreated components are likely to be used in the wrong situations.
- Truss manufacturing is simplified with fewer levels of treatment required. At present, inappropriate levels are often specified and ordered.

A final defence is necessary

- No cladding system is foolproof, and leaks will occur at some stage in a building's lifetime.
 - Even well-designed and built houses may leak sometime. The structure must be robust enough to cope with poor maintenance. Decay can start before the building is finished. Leaks can also result from plumbing, settlement and seismic movement, and may occur after the 15 year minimum durability required for durability.
- Brown rot is common and is too difficult to isolate from structure and if decay starts, it can spread beyond external frames.

- Douglas Fir does rot. All timbers containing sapwood are vulnerable to decay, including Douglas fir. Treatment allows time to rectify leaks and limits the damage.

Ensures the reputation of New Zealand's timber

- New Zealand's reputation has been badly tarnished
 - We need to restore confidence in the product. The perception of radiata pine is suffering in export markets

b) Those with some reservations:

Reservations

- Some sensitivity is needed on the toxicity of some treatments. The need is recognised for options other than boron in the short term, due to supply, but there is concern about the environment impacts of other types of treatments
- The proposed treatment is not sufficient for high risk buildings. In particular, it is not sufficient for monolithic claddings.
- Some low risk elements do not need treatment. Roof trusses should not need treatment, as there is no evidence of problems, and internal framing is not a concern, although junctions with external walls may be risky.

Recommendations

- Allow Douglas fir subject to risk assessment of nature, scope and location
 - Many considered that Douglas Fir should be allowed wherever H1.2 is required, while others thought that it should get product certification. Some thought it should be permitted in low risk areas such as behind cavities, brick veneer, weatherboards, internal walls and roof trusses, exposed beams, while others considered it should be permitted everywhere, except behind face sealed claddings. Some considered that we should revert to pre-1996 requirements.
- Increase level of treatment to H3 treatment for risky sites and for monolithic claddings.

c) Those advocating compromise:

Reservations

- Very high risk situations need H3 treatment, while low risk situations need no treatment
 - We should not use potential pollutants unless we have to, as there are potential health and waste hazards. The proposal eliminates viable alternatives and non-toxic options. Roof framing is not an issue, nor is sheltered internal wall framing.
- Using Alternative Solutions is not a practical answer as they are too expensive and time-consuming for most situations.
- The proposal is simplistic, too conservative and over-prescriptive. The whole industry has been punished by the problems of a few.
 - Such a prescriptive approach is not always warranted. It does not consider climatic variations. All timber species do not need treatment. Treatment must not be used to solve design and building faults

Recommendations

- Risk assessment should be used. Requirements need to be further defined rather than a blanket approach.
 - Treatment is not necessary for simple, traditional houses in low risk areas. The focus should be on the areas at most risk, by dealing with specific materials, design features and the inclusion of drained cavities. Use H1.2 for external walls behind monolithic

claddings. For other claddings use H1.2 only for wet area framing and bottom plates. Roof trusses are not a problem and do not need treatment.

- Douglas fir should be permitted, subject to risk assessment of nature, scope and location
 - It should be permitted in low risk areas such as behind cavities, brick veneer, weatherboards, internal walls and roof trusses, exposed beams. Other commentators considered that fir should be treated as being equivalent to H1.2.
- Untreated radiata should be permitted for brick veneer, all roof trusses, interior wall framing and exterior framing when a drained cavity is used.

d) Those advocating treatment only for riskiest areas:

Objections

- The Hunn Report did not include untreated timber as principal factor in the problems
 - Untreated timber should not be regarded as the cause of problems. Proposals should address causes of decay, not the symptoms. Water damages more than just framing, and H1.2 treatment allows little additional time for avoiding structural decay problems. Treatment must not be used to solve design and building faults. The leak problems relate to less than 1% of houses. There are plans to better regulate the building industry that will prevent such problems in future. Other solutions should be used, such as education, training, better detailing, inspections etc.
- It is unfair to ban the use of Douglas fir.
 - The proposal is based on misguided and incomplete information. Why change use where there is no history of problems? Douglas fir has a good heart content with reasonable decay resistance. It is less absorbent of moisture and has better durability, stability and strength than radiata, and its use allows a chemical-free option for framing. Treatment of Douglas fir is possible but difficult.
- We must not over-react to the current situation.
 - Houses have been built from decay prone rimu sapwood for over 150 years with no systemic problems. Blanket requirements are not warranted given proven performance of traditional materials like brick and weatherboard. There is insufficient clear evidence of significant problems, and current problems are largely confined to Auckland, with few in the South Island. Issues are confined to specific claddings and then only to outside walls. Potential pollutants should not be used unless absolutely necessary.
- The proposals fail to consider that:
 - Using Alternative Solutions is far too expensive and time consuming.
 - Some areas will have difficulty in achieving the required moisture content of treated timber at certain times of year.
 - Such a change will impact on the value of housing built with untreated radiata
 - Kiln-dried radiata is used extensively overseas without problems.

Recommendations

- Return to pre-1996 requirements where the treatment requirements related to particular situation of use and the particular species.
 - Other species are presently allowed in NZS 3604 – and these must remain suitable for framing without requiring the use of Alternative Solutions. Douglas fir and other durable species should be permitted in low risk areas such as behind cavities, brick veneer, weatherboards, internal walls and roof trusses, exposed beams. Some considered that Douglas Fir should be allowed as equivalent to H1.2.

- Changes should only be targeted to the wood properties of principal tree species, the type of structure and the nature of the cladding system. Treatment is not needed for simple, traditional houses in low risk areas.
 - Treatment should only be used for high risk situations such as bottom plates, decking and balustrades which need H3, high risk claddings, when there is a high risk of the timber getting wet, where a species has an on-site susceptibility to decay, and in naturally wet conditions or in the ground.
- Some thought that untreated radiata should be permitted for brick veneer, all roof trusses, interior wall framing and exterior framing when a drained cavity is used, while others considered that it should be able to be used in all areas of dwellings except for existing prohibitions, decks and balconies, and bottom plates, where there are no ventilated cavities.

e) Those advocating retaining the status quo:

Objections

- The Hunn Report did not include untreated timber as principal factor in the problems
 - Untreated timber should not be regarded as the cause of problems. Proposals should address causes of decay, not the symptoms. Water damages more than just framing, and H1.2 treatment allows little additional time for avoiding structural decay problems. Treatment must not be used to solve design and building faults. The leak problems relate to less than 1% of houses. There are plans to better regulate the building industry that will prevent such problems in future. Other solutions should be used, such as education, training, better detailing, inspections etc.
- It is unfair to ban the use of Douglas fir
 - The proposal is based on misguided and incomplete information. Why change use where there is no history of problems? Douglas fir has a good heart content with reasonable decay resistance and is used extensively overseas. It is less absorbent of moisture and has better durability, stability and strength than radiata, and its use allows a chemical-free option for framing. Treatment is possible but difficult.
- There is insufficient clear evidence of significant problems
 - Problem not caused by untreated timber, and will not be solved by treatment. Treatment will not stop leaks or damage to other materials and does not provide indefinite protection against decay as all timber will rot eventually if kept moist. Leaking buildings are unsuitable for habitation whether or not there is rotting timber. If cladding systems cannot keep water out, then they should not be used. Dry timber does not rot - as long as timber is kept dry, durability is ensured.
- We must not over-react to the current situation.
 - This is a step backwards and knee-jerk reaction to a small media-hyped problem. The wide-spread use of treatments in the past is partly responsible for the “dumbing-down” of industry, and this proposal will make things worse. Treatment was not used in Vancouver as a solution to similar problems, and will just add to the already high housing costs. Risks of storage and transit are overstated.
- Potential pollutants should not be used.
 - There is a history of toxic pollution, waste hazards and health risks of working and living with treatments. Toxins are poisonous, and homes are becoming chemical time-bombs.
- This is an expensive and ill-conceived proposal.
 - It will have adverse environmental consequences and will impose unnecessary regulation and costs. It fails to consider impact on housing built with untreated

radiata. It is likely to represent vested interests of competing products, and risks our international and domestic reputation, as consumers will perceive that timber was the problem not monolithic claddings.

Recommendations

- The need is to identify the problem, list the likely causes and select methods to eliminate or minimise the problems
 - The problem is decay from leaks. The likely causes are poor design, construction and inspection processes along with poor cladding systems that have poor flashings, installation practices, sealants, and details. The solution is to improve these with guaranteed materials, design and details.
- Water penetration must be prevented, rather than just trying to deal with it once it gets in. If the Building Code is adhered to, then water will not get in to start with.
 - The solution must focus on improvements to design and detailing, better education and training, improved inspection and consent processes, and increased accountabilities for all parties.
- Douglas fir and untreated radiata should be able to be used in all areas of dwellings as they are at present.
 - Other species are presently allowed in NZS 3604 – and these must remain suitable for framing without requiring the use of Alternative Solutions.

f) Conclusion:

As can be seen from the summarised comments above, the range of views is very wide. At one extreme are those who completely support the proposals or, in a few instances, want a higher level of treatment. At the other end are those who want no change to existing requirements with untreated timber being able to be used in all areas of building to the level that it is at present.

In between are the majority – who argue for varying levels of compromise between the two extremes. The threads that are common to this group are that:

- ***Douglas fir should continue to be allowed for some or all framing.***
- ***Treatment should be aligned to the specific risks involved in the design and/or materials***

5. IDENTIFICATION OF TREATMENT

Although this attracted a large number of comments, the proposals for identification of timber treatments attracted substantially fewer views than those for treatment levels, and the range of opinion was not so wide. Most commentators generally supported the aim of improved identification, with disagreement limited to the detail of how to achieve the aim.

The comments are grouped into broad categories that reflect the range of opinions relating to:

- ***Colour coding of treatment level (Hazard class)***
- ***Position of branding of treatment type***
 - *Edge branding*
 - *End branding*
- ***System of branding of treatment type***
 - *As proposed*
 - *Alternate method*

a) Colour coding of Hazard class:

Colour choice:

- There is likely to be confusion due to be poor colour distinctions.
 - The colour spectrum must be very prominent and consistency of colours must be adopted. The pink dye in boron process will be ineffective and removed during planing. Colour dyes will fade, so indelible branding is preferable.
 - A few thought that treated timber should be green, while other considered green dangerous as the timber would be assumed to be old-style 'tanalised pine'. One suggestion was to make untreated radiata be coloured, rather than the other way around. Many pointed out that Douglas fir has a distinctive colour and would cause no confusion as it is easy to identify.
- Colours by themselves are not sufficient, as they do not show the type of treatment.
- Clear colouring must not be used for any treated timber
 - It will be too confusing and will allow untreated products to pass as treated. Clear colouring should identify and be limited to chemical-free timber.

Colours are sufficient by themselves

- Only colour identification should be required
 - It is a sufficient means of identifying the preservative used. If the issue is that of Hazard Class identification, why require additional identification as well. This will lead to confusion, rather than avoid it. A coloured stripe is preferable, as it would be cheaper.

b) Position of branding of treatment type

Support for edge/face branding

- All timber needs to be continuously edge-branded for consumer protection as end brands can too easily be cut off on site. Colour only should not be an option - timber must be branded at 600mm centres. Branding is needed on more than one edge so that it is always visible after installation.

Concerns from timber industry

- There must be more flexibility for frequency of repetition of edge branding.
 - The main mills run stress grading units that are not capable of meeting requirements. There are limitations to most inkjet printing systems and the speed of MSG machines. 1500 centres will be sufficient to identify all timber somewhere along length.
- Edge branding is not practical, end branding is sufficient
 - Main mills run stress grading units not capable of meeting requirements. Little benefit is gained from additional branding. Most plants only use one chemical for each Hazard Class, so there should not be confusion. It is not possible to face brand rough sawn timber.

c) System of branding by treatment type

Concerns from timber industry

- There is too little room on the end of small profiles for the proposed lettering
 - Including preservative name is impractical except in strip branding. There is little benefit to be gained in additional information. The key information is the plant number, as few use more than one type of chemical for each Hazard Class.

Alternative coding system

- We should use alternate 2 digit numbering system as in Australia
 - This end branding system covers all treatments except IPBC. The code allows easy identification of treatment type and numbering will fit more easily on the ends of timbers. Exporters are already complying with this system, and the system will rationalise the two markets.

d) Conclusion:

As can be seen from the summarised comments, there is a range of views regarding what type of identification is considered to be sufficient.

There are many concerns regarding the particular colours that should be used to identify the level of treatment that has been used. The aim of identification at a building site level is that distinct standard colours should provide a quick visual reference for both the builder and the Territorial Authority or certifier responsible for ensuring code compliance. Most concerns related to the possibility of confusion when using the colours proposed, in that they were not considered sufficiently distinct. There was also concern regarding the use of clear colour for any treated timber, with commentators believing that all treated timber must be distinctly coloured, and that clear timber should specifically identify untreated timber.

The practicality of continuous edge or face branding was raised by most commentators from the timber industry. Although it was suggested that 1500 centres would be achievable, most seemed to think that any edge branding was impractical for most of the main mills and that end branding is sufficient for the identification of treatment type.

A code numbering system as used in Australia is suggested by some from the timber industry. This solves the practical problems associated with the size of the brand, and allows alignment of the domestic market with the Australian export market.

6. DURABILITY TABLE REQUIREMENTS

This area attracted a similar number of comments to that for identification. Comments focused on the particular durability periods required in the table. These are presently set at 5 years, 15 years and 50 years; depending on the visibility of defects and the ease of access for replacement of the particular element.

Comments have been grouped into 3 broad categories:

- *Those who considered that periods are too low*
- *Those who think that there should be a fourth period, between 15 and 50 year levels.*
- *Perceived anomalies with regard to accessing building elements*

a) Requirements are too low

- There is no place for 5 year durability
 - 5 years is far too low, and should be replaced with 10 years. 5 years does not encourage development of better materials. 15 years should be increased to 25 years.
- Periods of 5 and 15 years in particular are too low as benchmarks for durability in relation to premature failure and community expectations of durability.
 - These low periods have affected the approach of trades and inspectors to the quality of work. The building and manufacturing industry must be capable of delivering service lives that are considerably more than those currently required. The excessively low requirements in this table have been one of the main causes for the

severe decline in standards of workmanship. The cladding function is to protect the structure, and the durability requirement should better reflect that. The current leak problems show ample evidence of the risk to the structure when the cladding fails.

- Most owners would be appalled to realise that legal protection offered by the Code is only 15 years for cladding. This implies that they could have to replace their cladding three times within the notional life of their house. Periods should be regularly reassessed in light of improved products, and the bar raised to suit those products.
- Other factors should be considered when setting minimum durabilities.
 - Other important factors include costs of replacement, consequence of failure in terms of safety of occupants, importance of element in the overall performance and public expectations.

b) Need for an extra period

- The jump from 15 to 50 years is too large
 - A new 25 to 30 year durability requirement should be added, with many items that are presently noted as 15 moved to this new level. Many 5 year items should then be moved up to 15 years.

c) Anomalies in table

- The required durability of an element must relate better to its situation, as there are too many anomalies such as:
 - Underlays or underlying elements must have no less durability than the covering element. An underlay cannot be replaced without removing roofing. If the cladding is expected to last 30 years, then the underlay should match that. The same principle applies to wiring, fixings, plumbing etc.
 - If the structure needs protecting, then the cladding durability should be closer to that of the structure. If an item is protecting a structural component, then it should match the life of that component. This applies to DPM under bottom plate of framing or behind retaining walls, flooring under bottom plates and flashings protecting structure if inaccessible. If the cladding has a high expected life (eg brick), then flashings must match that life
 - Silicon and other sealants are widely relied on for protecting against moisture ingress and are often impossible to replace so they must match the life of the element they are used in the life of the cladding
 - Hardware on fire rated doors should be required to match the durability of the door, and durability of insulation should match that required for the wall it is installed in.
 - Guttering should be further sub-divided.
 - Secret gutters are difficult to inspect and replace, so should have higher requirements. External guttering that is difficult to access should also have increased durability requirements.

d) Conclusion

Most commentators considered that the durability period needs reviewing with the aim of reducing anomalies and increasing requirements for many of the elements covered. Many considered that a new level should be inserted, at about 25 to 30 years to allow for more logical choice of requirements for some elements.

The overall feeling was that requirements need to be raised. Interestingly, no commentator mentioned the need for or the role of proper maintenance in achieving durability

7. DOUGLAS FIR

Some of the concerns related to the Douglas fir industry have been covered in the discussion on proposed treatment levels, and these will not be repeated. However, there are some additional points relating to potential effects that are covered below.

Most concerns came from the South Island, and it is obvious that this issue is taken very seriously. It is unusual to have comments from the public, but in this case there were 16 submissions from people not associated with the building industry. All of those were in regard to the potential exclusion of Douglas fir. One submission was sent from a timber mill, and signed by nearly 40 workers. Every South Island Territorial Authority raised concerns, indicating that some modification should be considered in order that the use of Douglas Fir can continue. There were also a number of other interested parties, including the Ministry of Agriculture and Fisheries.

Points raised in the comments include the following:

From Territorial Authorities:

- There have been minimal problems in the South Island where Douglas fir is widely used. The proposed changes will inflict significant economic losses and is seen as seriously discriminating against the South Island economy, with losses to forest owners, forest companies and timber processors.
- The proposed changes will reduce the diversification in the forest industry, and will remove a desirable environmentally friendly product from the market.
- Builders are expressing outrage at this sector being penalised due to the failure of another sector to design and construct watertight buildings in a completely different area of the country.

From other interested parties:

- The estimated sustainable value of sawn timber from the current estate totals one billion dollars, at \$320million per year.
 - The proposed changes will produce severe adverse affects on the Douglas fir industry, and will essentially eliminate the NZ market, despite the timber having an excellent reputation locally and internationally. They will lead to uncertainty for growers and processors and essentially mean that the industry would be forced to refocus almost entirely on the export market, where success is unlikely in the short term. They are contrary to Government objectives of maximising onshore processing.
- A few commentators pointed to specific instances of decay of Douglas Fir.

From Builders:

- Being unable to use Douglas fir is a huge loss to the industry
 - The price is too high for the wrong solution – Douglas Fir is a good timber and should not be blamed for the current leak problems.
- The proposed changes would devastate the Douglas fir sector. Businesses will close and jobs will be lost.

From the timber industry:

- The effect of the proposed changes would have enormous effects, particularly in the South Island regions of Nelson, Marlborough, Canterbury, Otago and Southland, and would bankrupt some forest companies, result in major losses of jobs and lead to major effects on local communities.

- Like other southern regions, Otago has had a marked increase in demand for Douglas fir over the past five years, and this has led to a dramatic expansion of the region's forestry industry.
 - Douglas Fir comprises 23% of this region's total forest estate, compared to a national figure of 6%
- The proposals fail to recognise that:
 - The domestic market takes 80% of the framing timber production. There are few alternate uses for the timber that is presently used for building. In some areas, there are insufficient alternate species available to fill the gap for domestic framing. In practice, merchants will not stock Douglas fir given the few buildings that it could be used for. Some companies have developed niche markets in certain areas, where a whole package of beams, trusses and frames need to be sold to be economic.
 - The export market is limited. The demand is for large diameter and long length logs. There is competition from North America. Japan takes a narrow range of quality grades.
 - There are related parties who will be badly affected. Seed producers need two years lead time to respond to species changes. Nursery growers plant seed two years before seedlings are on sold.
 - For some mills, Douglas fir may be a minor part, but for others it is the major part and some mills process Douglas fir exclusively.
- The effects of such a change will not be temporary as owners cannot change stock quickly. It can take up to 45 years to make such changes to the species structure.
 - Growers would potentially lose more than 40 years of sunk costs. The land used for growing Douglas fir is not always suitable for changing species, and some would become unproductive.
- Exclusion of Douglas fir will prevent longer term rotation plantations that ensure diversity of species. Mono-culture is dangerous with a reliance on a single species.
 - It would bring increasing possibilities of diseases with a decreasing gene pool, and affect the ability to meet international standards of biodiversity. It would prevent the ability to maintain a viable alternative to radiata in order to protect against the risks of over-reliance on a single species in relation to pests.

8. THE USE OF CHEMICAL TREATMENTS

Concerns were expressed as to potential hazards involved in the treatment process, and the handling, use and disposal of chemically treated timbers. Some of these have been mentioned in the discussion on proposed treatment levels, but additional specific comments were made.

a) Concerns relating to chemical treatments

- Although we may have to rely on current risk assumptions, further studies are required into the risks of exposure to treated timber. We must also continue to seek and research the best and least toxic options. Increasing use of treated timbers could create liability issues for government agencies.
- CCA has been identified as a toxic material, containing arsenic which is acutely toxic and a known carcinogen
 - There is growing evidence that is causing authorities around the world to impose restrictions on manufacture, use and disposal. There is evidence that arsenic leaches out of wood over time and can be washed off by rain to accumulate in the soil. Arsenic levels on CCA treated wood remain high for 20 years and should not be present in houses, as it is too dangerous.

- The contamination of treatment sites has long been recognised, along with the affects on worker health Australia, NZ and USA are the world's largest users of CCA.
- While CCA is a toxic chemical, its use is still necessary.
 - The weight of evidence is insufficient to consider restricting its use. It has served well for 50 years and we move away from such a benchmark product at our peril. It is accepted that there is some residual problem, but once the timber has fully dried there is no longer any hazard.
 - We should have requirements that residual sawdust and off-cuts be removed from site each day, and that no timber will go into service until it is dry in order to protect consumers.
- There are also serious reservations on the increased use of TBTN and TBTO which are known to be toxic
 - There are reports of worker reactions to handling timber with such treatments. Providing protection could be a major cost and builders are unlikely to wear protective clothing. The use of toxic treatments should be limited, and we should aim for safer options such as boron.
- The health and environmental costs and benefits of using treated timber must be considered.
 - Many consumers have a negative perception of treated timber and we must ensure that other safer treatments or alternative materials are available. We need to modify the way in which the underlying standards apply in order to ensure that environmental and health concerns received sufficient attention. BIA is not bound by decisions made by SNZ. Some consider that proposed treatments should only allow boric-based or waterborne copper naphthenate treatments which can be used to achieve H1.2.
- The proposals will lead to large increases in the amount of treated wood wastes in land fill
 - At present off cuts are used for firewood, landscaping etc., which will no longer be possible. The change goes against local strategies to reduce waste. There are also fire risks associated with the storage of LOSP timber.

b) Conclusions

There are clear concerns about the use of chemical treatments, particularly in regard to CCA. However many feel that we have no option but to continue the use until there are other safer alternatives available that are as effective, despite the additional hazards involved in handling, use and disposal of treated waste.

It is obvious that some consumers will insist on choosing chemical-free timbers, and the number may grow in the future.

9. OTHER ISSUES

a) Alternative option

An alternative option, considered but not preferred by the Authority, was described in the document. This would have restricted treatment to exterior wall framing and all bottom plates, while allowing kiln-dried radiata and untreated Douglas Fir to be used for interior framing and roof trusses.

Reactions to the alternative treatment option were generally similar to those described in Part B.4.TREATMENT LEVELS, where more than 60% wanted varying degrees of compromise. Considerably fewer comments were made on the alternative than on treatment levels (approximately 40 compared with 200 on treatment levels), so the weight of opinion should be treated with caution.

<i>In favour of alternative option</i>	25%
<i>In favour, but with reservations</i>	46%
<i>Against alternative option</i>	29%

As shown, more than 70% of those who commented on the alternative option were either in favour or generally agreed with some reservations (in most cases, these involved concerns that the alternative was still too conservative).

Those supporting the alternative option had the following reasons:

- The reference to plumbing leaks is not justifiable.
 - They can usually be discovered quickly and be addressed well before decay occurs. They only affect a small part of a wall and the worst damage is from overflowing baths, washing machines (it makes more sense to require coved vinyl floor covering and floor drains).
- The justification of a simple single treatment regime being easy to police is not valid.
 - A simple, colourful and easy to read identification system is the solution. The proposed different colour continuous branding should avoid any confusion. While one treatment for all might be simple, there are still higher levels required for certain other elements.
 - Pinus Radiata, if kiln-dried, should be permitted for use for internal framing, subject to distinctive marking and grading. Specification documents should clearly demonstrate this.
- All timber is likely to get wet during construction and needs to dry out prior to lining.
 - If untreated radiata is not rotting at present due to getting wet during construction, then there is no reason to treat internal framing. Some damage to timber may occur, but this should be solved by educating trades about storage and transport.
- The alternative option is a much more sensible approach.
 - The blanket treatment proposal is more than just conservative, it really is unnecessary. Internal walls have a virtually negligible probability of decay and also an extremely low impact if decay does occur.

Those partly supporting the alternative, had the following reservations:

- The alternative is better than proposed solution but it is still too conservative.
 - The source of problem should be dealt with by not allowing water to enter.
 - Untreated external and internal framing should be able to be used with Masonry veneer with 40 mm cavity.
 - Douglas fir (heartwood) should be retained as framing timber and part of the Acceptable Solution.
 - Untreated pinus radiata and Douglas-fir should be permitted in internal and mid-floor framing (except bottom plates around wet areas), and on all roof trusses, exposed purlins and rafters.
 - Treated timber should be used only for higher risk applications, such as monolithic cladding directly fixed to framing.
 - Untreated timbers such as Douglas-fir and macrocarpa are safe alternatives to treated timber, if used with good design, good workmanship and appropriate materials.
- The alternative is better than proposed solution but needs to be somewhat more conservative.

- Internal walls should be treated, but roof timbers can be untreated. There is little evidence of decay in Douglas Fir trusses and roofing timbers.
- Untreated Douglas-fir should be permitted for internal framing but untreated Pinus Radiata should not be permitted.

Those against the alternative had the following concerns:

- It is too likely to lead to confusion in the market and on site. The simplified approach is preferable.
 - There is no merit in providing different level of treatment to bottom plates of interior walls. Many internal walls are closely aligned to wet areas.
- It leaves the door open for abusing the system as untreated components such as lintels and boundary joists will be used.
- There are size differences between treated and untreated timbers. It would not work to mix treated radiata for exterior walls and DF for internal and trusses because of size differences.
- Decay can spread well beyond the external walls. Water may soak through treated timber and affect untreated part of framing

b) Industry logistics

Comments included the following views

- There is some doubt as to the industry's ability to provide dry treated timber framing to the extent that would be required by the proposed changes
 - The proposed changes must not diminish the responsibilities of all parties to properly control the transportation, storage and installation of materials
- Others consider the capacity of current treatment plants is sufficient to meet expected demands
- Staged implementation is advisable, as there may be some supply delays on introduction with regard to resource consents, plant modifications and timber drying after treatment.

It appears that there are few major concerns about the ability of the industry to generally cope with the proposals.

c) Export markets

- Treating for NZ does not create a significant precedent as other markets often treat at destination. Most exported radiata is sent to Australia and is generally treated at source or at destination.
- The leaky building issue is already affecting the perception of NZ radiata pine in many markets, and it is important that this is turned around.

Overall, little concern was expressed as to effects of treatment proposals on export markets.

10.SUMMARY OF KEY POINTS

The issues specific to B2 that attracted the most concern from commentators were (in order):

- *Treatment levels proposed*
- *Douglas Fir issues*
- *Identification of treatment type and level*
- *Requirements in durability table*

a) Treatment levels proposed

This was the particular issue that attracted the largest number of comments. Some commentators were fully in favour of the proposals, some totally disagreed, and others fell between those two extremes.

At one extreme are those who complete support the proposals or, in a few instances, want a higher level of treatment. At the other end are those who want no change to existing requirements with untreated timber being able to be used in all areas of building to the level that it is at present.

In between are the majority – who argue for varying levels of compromise between the two extremes. The broad threads that are common to this group are that:

- ❑ *Douglas fir should continue to be allowed for some or all framing.*
- ❑ *Treatment levels should be aligned to specific design risks.*

b) Douglas Fir issues

Many commentators saw the proposals as effectively banning the use of Douglas Fir in residential construction. Most concerns came from the South Island, and it is obvious that this issue is taken very seriously.

It is unusual to have comments from the public, but in this case there were 16 submissions from people not associated with the building industry. All of those were in regard to the potential exclusion of Douglas fir. One submission was sent from a timber mill, and signed by nearly 40 workers. Every South Island Territorial Authority raised concerns, indicating that some modification should be considered in order that the use of Douglas Fir can continue. There were also a number of other interested parties, including the Ministry of Agriculture and Fisheries.

The broad common threads running through most of the comments were in regard to:

- ❑ *The lack of historical problems with decay of Douglas Fir framing.*
- ❑ *The removal of a chemical-free option for framing*
- ❑ *The long-term adverse effects on the Douglas Fir industry, and on local economies.*
- ❑ *The decrease in species diversity with the risks of over-reliance on a single species.*

c) Identification of treatment type and levels

There was broad agreement as to the need for clear identification of treatment, but there was a range of views as to what system is considered to be sufficient.

Common issues raised were in regard to:

- ❑ *The need for clearly distinguishable colours for Hazard class of timber.*
- ❑ *The need to use clear colour only for untreated timber*
- ❑ *The practicality of continuous edge or face branding of treatment type*
- ❑ *The preference for use of Australian coding system for treatment type*

d) Durability table requirements

This area attracted a similar number of comments to that for identification. Comments focused on the particular durability periods required in the table. These are presently set at 5 years, 15 years and 50 years; depending on the visibility of defects and the ease of access for replacement of the particular element.

The overall feeling was that requirements need to be raised. Most commentators considered that the durability table needs reviewing with the aim of reducing anomalies and increasing

requirements for many of the elements covered. Many considered that a new level should be inserted, at about 25 to 30 years to allow for more logical choice of requirements for some elements.

Common issues raised were in regard to:

- *The 5 and 15 year durability periods are too low for most items and need to be raised*
- *There should be a fourth period, inserted between 15 and 50 year levels.*
- *Anomalies with regard to accessing building elements must be eliminated*

C. COMMENTS ON E2

1. INTRODUCTION AND BACKGROUND

The *Report of the Overview Group on the Weathertightness of Buildings* (August 2002), commonly known as the Hunn Report, called for issues of weathertightness to be addressed. In particular, it recommended:

That the BIA:

a) develop more prescriptive Acceptable Solutions and Verification Methods for the Approved Documents B2 Durability and E2 Weathertightness;

The proposed E2 changes released for public comment include more details on how to achieve weathertightness with the aim of addressing concerns regarding present practices and of providing guidance to the industry on what is acceptable practice.

The documents comprised two volumes. Volume One covered changes to Clause E2, Verification Method E2/VM1, and the text of the Acceptable Solution E2/AS1. Volume Two comprised construction details to be used as part of E2/AS1.

2. OVERVIEW OF COMMENTS RECEIVED

There were a total of almost 3,000 comments received from 189 commentators in relation to the proposed changes to E2. These ranged over a variety of topics as shown below:

E2 Comments - subjects

General and Scope	174	12%
Clause E2	53	4%
Verification Method	99	7%
Summary of proposed changes	28	2%
Compatibility of materials	56	4%
Systems versus materials	16	1%
Cladding finish colours	15	1%
Weathertightness Risk:		
<i>Risk matrix</i>	32	
<i>Risk Factors</i>	133	
Total comments on risk	165	11%
Roofing:		
<i>Roof Wall Junctions</i>	16	
<i>Parapets, Balconies & Decks</i>	54	
<i>Roof Claddings</i>	27	
<i>Concrete and clay tiles</i>	19	
<i>Pressed metal tiles</i>	50	
<i>Profiled metal roofing</i>	101	
<i>Membrane roofs and decks</i>	75	
<i>Roof underlays and wall wraps</i>	14	
Total comments on roofing	286	19%
Walls:		
<i>Walls general</i>	54	
<i>Airseals</i>	28	
<i>Bottom of cladding/changes of plane</i>	20	
<i>Drain ventilated cavities</i>	83	
<i>Penetrations</i>	35	
Total comments on walls	220	15%
Wall claddings:		
<i>Brick/concrete veneer</i>	15	
<i>Stucco cladding</i>	31	
<i>Timber weatherboards</i>	42	
<i>Fibre cement weatherboards</i>	10	
<i>Horizontal corrugate profiled metal</i>	80	
<i>Fibre cement sheet</i>	42	
<i>Plywood sheet</i>	18	
<i>EIFS</i>	84	
Total comments on wall claddings	322	22%
Floors	38	3%
Construction Moisture	19	1%
Total comments on text	1481	
Total comments on diagrams	1477	
TOTAL COMMENTS ON E2 PROPOSALS		2958

As may be seen from the above table, there were similar numbers of comments on the text and the diagrams.

The following shows the topics covered by comments on the diagrams:

DIAGRAM COMMENTS		
Range of diagrams	12	1%
Roof/wall junctions	31	2%
Parapets/Decks	101	7%
Decks	22	1%
Roof Claddings	748	51%
Wall Claddings	548	37%
Floors	15	1%
TOTAL	1477	

The tables show those topics that were of most concern. Many comments were at a detailed technical level, and these will not be discussed below as they can be handled at a similar technical level. The main areas of concern in regard to broad issues are:

- *General issues and scope*
- *Weathertightness risk evaluation*
- *Materials*
- *Roofs - general*
- *Walls – general*

The following summarises the main concerns and varying opinions expressed by commentators.

3. GENERAL ISSUES AND SCOPE

a) General issues and concerns

In a similar fashion to that described for B2, many comments on the E2 proposals covered issues that were outside the control of the proposals, such as education, research, accountability, consultation requirements, reasons for the current problems, problems connected with other parts of the Code, process issues regarding the processing of Alternative Solutions and other various matters beyond the scope of the Building Code.

The following outlines some of the more specific concerns that were raised.

Consent processes

- The process of gaining specific objective approval of Alternative Solutions must improve and be within reasonable time and cost frames
 - This is needed to allow for innovative design solutions. The increased numbers of detailed Acceptable Solutions are likely to make Alternative Solutions harder to achieve. The Acceptable Solution is too restricted, and is likely to lead to more consents falling under Alternative Solutions, rather than less as was expected.
- The adoption of a new building envelope form is recommended for inclusion with consent documentation in order to show how designer has given ‘due consideration’ to external envelope design issues as required by the clause.
 - What is *specific weathertightness design*, and who is a *weathertightness expert*? Is it an architect, or a specialist of some other order?

Degree of change proposed

- We must be careful that this does not become an over-reaction.
 - The level for low risk must be carefully considered in order to keep costs down.
 - We must ensure that Territorial Authorities and Certifiers are not put under unreasonable pressures to prevent all design inadequacies
 - Architects have always been willing and able to take responsibility for what they do, and will continue to do so irrespective of knee jerk, politically motivated regulatory change brought about by largely unsubstantiated, media-enhanced claims of systemic building industry failure.

Form of Acceptable Solution

- The detailed parts of the text and the diagrams would be more sensible in the form of a guidance document that can be referenced by the Acceptable Solutions.
 - Such prescriptive Acceptable Solutions are not desirable in 2003
 - People on the job relate to details and drawings not to written rules The diagrams should be published as part of NSZ 3604 to become a self-contained ‘builder’s bible’
 - A separate code or guidance document is needed also for multi-unit construction, with a process for design, costing and tendering of these complexes.
- Despite their apparent usefulness, the concept of the Acceptable Solutions is flawed:
 - There will never be sufficient to satisfy everyone. They are contrary to a performance-based Code. From the range of argument, it is apparent that producing a long list of Acceptable Solutions will not work.
 - For every one put forward, it is possible to show that, in time, it is unworkable for all situations and it will need special conditions applied for use. Inspectors will be unable to distinguish between correct and incorrect solutions.
- Although the need to supply as much information as possible is understandable, the proposed Acceptable Solution must be kept concise and up to date.
 - It must be restricted to critical information and be consolidated as much as possible, as it is essential that the document is as readable as possible. When the quality of information is questionable, or when areas are omitted, these must be included in later revisions. There must be regular updates of the Acceptable Solutions and Verification Methods.

Imported information

- There must be caution with respect to the use of unfiltered information from the Northern Hemisphere.
 - Much is not valid when imported to NZ climate, practices, and materials. This applies particularly to airtight barrier sheathings and vapour barriers where incorrect use would result in widespread structural moisture failures in NZ.

Overlap into other Clauses

- The documents contain too much overlap into areas covered by other clauses of the Code
 - The line between durability and weathertightness is blurred, and structural aspects that belong in the Structure clause are covered in this clause.

b) Issues of scope

Comments generally related to concerns that the Acceptable Solutions seem to be limited, or too focused on, small scale, stand-alone housing. Many suggested that the scope should be expanded to cover all of those buildings that fall with NZS 3604.

Others were concerned at limits imposed by those materials or systems that the Acceptable Solution does not cover.

Types of building

- All buildings require to be weathertight. It is wrong to restrict the Acceptable Solutions to smaller housing. All buildings fall within the Building Code, so E2 should apply to all.
 - There is too much focus on smaller housing and this is too restrictive. Reference to more complex projects such as multi-storey apartment complexes is needed. Commercial and industrial buildings should be covered; at least those that are small scale and use domestic style construction and materials.
 - There is no mandate to restrict the scope to buildings covered by NZS 3604. Also, many houses have parts that are covered by other standards and other construction types should be covered such as concrete block buildings, steel-framed buildings and smaller multi-unit properties that need fire separation.
- The use of the terms "*housing*" and "*residential*" should be reconsidered.
 - "*Construction type*" is a better distinction. Buildings covered would be timber framed buildings not requiring specific design. All other buildings would therefore require specific design and alternative solutions.
- Some explanation regarding existing buildings is needed.
 - This is not an issue until alterations or additions are made. New work will have to comply and old work will not.

Size of building

- The floor area that the Acceptable Solution covers must be restricted, as well as the height.
 - Very large terrace-house style complexes require specific design. These have had some of the worst problems, and those problems are repeated many times in such complexes.
 - Unlimited floor area creates seismic and structural control joint problems. These require specific design to accommodate likely independent movement. Specific design is also required for changes in ground levels where wall junctions need to accommodate likely independent movement.

From the comments covered above, there are clear differences in opinion as to how much the Acceptable Solution should include. However, most commentators thought that it should aim to cover more than it currently does, at least extending to domestic type construction that may be used for smaller scale commercial or industrial buildings.

Types of materials

Particular concerns were raised concerning materials and systems that are not covered in this Acceptable Solution. These included:

- Concrete masonry construction
- Steel framed buildings
- Timber window joinery
- Aluminium roofing
- Timber roof trusses

4. WEATHERTIGHTNESS RISK EVALUATION

There were many comments with regard to the concept of evaluating the risks involved for a particular design on a particular site. There are two possible systems of evaluating risk, and there was some confusion as to what was actually proposed by the Acceptable Solution.

- **Risk evaluation table:** this is a point-scoring matrix that covers materials and design.
 - The result risk level is determined according to the score of the proposed building
- **High/low system:** this is presently proposed in the Acceptable Solution
 - A simple high low risk classification is assigned if a proposed building contains certain features. A high risk leads to a requirement for a drained cavity.

a) Summary of comments

For ease of discussion, the terms *matrix* and *high/low* will be used when covering the comments.

Risk evaluation matrix

- This method is better than a simplistic high/low system, but there are some detailed concerns
 - It is too open to interpretation and may prove too confusing in practice and may lead to wrong classifications. One part of a building being high risk should not mean that the whole building is classified as high risk. Why are two and part two storeys treated differently?
- The term architectural complexity is too subjective
 - It does not necessarily have anything to do with weathertightness. It must be better defined as it will generate argument. Sketches or definitions should be added to describe complexity.
- The threshold point levels that trigger risk are too conservative and should be raised in order to avoid unnecessary costs and other potential problems that cavities can lead to.
 - The proposed levels would lead to too many common buildings classified as high risk, and would mean that every building with a balcony is high risk, even if that balcony is sheltered. The number of storeys is over-weighted. The levels chosen should reflect the vast improvements made in past year eliminating many leaking causes. A score of 8 to 10 would be more appropriate, with scores over 20 directed to "*specific weathertightness design*".
- The matrix needs to include for other important factors, including
 - Cladding type, including multiple cladding types.
 - Ratio of exposed wall to eaves
 - Climatic conditions including rainfall intensity, of site and of area, total annual rainfall and average annual humidity.
 - Process issues such as type of building procurement, type of contract and supervision, and builder and designer qualifications.

High/low system

- System is too simplistic, conservative and limiting. If a building has all of a list of features – then it is low risk. If it has any one of a longer list of features, then it is high risk.
 - Features referenced are parts of the building, and inclusion of one should not automatically reclassify whole structure. If a building has 2 facades with high risk features and 3 with low risk, is it high or low risk? Should risk be defined wall by wall, or facade by facade? Should judgement be quantitative? Does 75% low risk lead to low risk?

- Existing and well-proven systems would be caught up in this very conservative catchall solution to a confined problem.
 - It is not fair to lump all claddings in with those responsible for most of the leaks. It is ridiculous that proven construction techniques such as bevel back weatherboards may require cavities. Weatherboards have a tradition of multiple details and practices that have successfully evolved. They have been used extensively in high risk situations – there is no need to have drained cavities.
 - Corrugated steel sheet should not be in the same category as flat sheet claddings as it has unique characteristic and should not be limited to cavities only as this introduces additional complexity and hazards for an already successful system.
 - It is invalid to assume that a part two storey house with a pitched roof, wide eaves and a covered balcony should automatically require a cavity. If timber weatherboard and double storey and eaves and in moderate wind zone, then it should be low risk. If monolithic and double storey and/or no eaves then should be high risk
- Requirements are far too stringent and would put almost all buildings into a high risk class
 - This is not backed up by the percentage of failures that have happened. Investigations show 70% of leaks are due to bad workmanship and design. The vast majority of houses are not leaking. The Acceptable Solution would put too many buildings into specific design and result in more costs to client.
- A medium risk category is required
 - The high/low split is too black and white. An interim level is needed that would allow simple 2 storey houses in low and medium wind zones to be built without cavities. A medium class would focus the high risk category on the real problem designs. It would allow amendments to cover medium risk claddings and make the Acceptable Solutions more acceptable.

b) Conclusions

It is clear that most comments support the general concept of evaluating the risk applicable to a specific design, but that commentators are not happy with any method that is too simplified. Most also considered that the levels set by both systems are higher than is justified for many materials and features.

Most prefer the alternate matrix system, although there are differences in opinion on the complexities involved. Some consider that it is too complex with too many subjective parameters that would cause confusion. Others think that more site-specific parameters should be added to the evaluation.

Few seemed to support the simple split into high and low, as this appears to produce too many erroneous classifications by picking up traditional types of construction that have a long history of successful use.

A number of commentators advocated the refinement of the high/low split to include a medium category that would prevent inappropriately high classifications. The aim may be to produce a balance between a reasonably simple system of risk evaluation with one that can include extra categories and parameters.

5. MATERIALS

a) Flashings, fixings and compatibility of materials

Most comments received relate to specific detailed requirements, rather than general areas of concern. These are therefore not appropriate to summarise, as they need to be handled at a detailed technical level, with appropriate specialist advice and amendments made as necessary.

A small number of comments covered general items, as noted below:

Flashings have been neglected

- They have become an optional extra cost to houses rather than a part of the process, and have therefore been left out.
 - There is insufficient current guidance on flashings that is up-to-date. Too much reliance is being placed on sealants to replace traditional flashings.

Extra information is needed

- Documents should include a functional requirement of flashings that would spell out what a flashing is and what it must achieve.
- Durability of flashings must be addressed. For example, galvanised flashings cannot be embedded in stucco without other protection as they corrode.
 - Should include a table of approved metal materials for use in flashings, roofing and cladding to cover base metal thickness, hardness ratings and coating details. Should also include a table of fixings.
- Other flashing materials should be covered

Compatibility issues

- While the general intentions behind the requirements are agreed with, there needs to be clarification as to who is ultimately responsible for verifying compatibility.
 - A section on compatibility of fixings is also needed to ensure that they are aligned to appropriate environmental categories and are compatible with roofing and/or cladding material.

b) Systems versus materials

The Acceptable Solution sets certain requirements for some types of cladding systems to be treated as a complete system, rather than a collection of parts. Comments include the following:

Requirements need expanding.

- There needs to be more emphasising that any components used with a cladding should be part of tested system
- The list of claddings to be considered as systems is too limited.
 - Stucco should be added
 - Textured fibre cement should be expanded to cover the many different variants
 - membrane suppliers should also supply substrate and other components although most players are not set up this way.

Requirements are too vague.

- Who approves substitutions? How can the sourcing of materials from one supplier be policed?
 - Manufacturers must back up with a durability statement that components will meet requirements of the cladding system they are used with. Fixers should be approved by the manufacturer of the cladding. Manufacturers must list products that are approved as Acceptable Solutions.

Requirements may not be possible

- It is often not possible for all parts of a cladding system to be sourced from single supplier.
 - Some components of some systems are not sourced from system supplier. Cladding suppliers often do not supply the finish. It is more common that systems are specified by the supplier but not supplied. A supplier statement may cover such problems.

Proprietary products

- The techniques for jointing and fixings of the material itself should remain as per manufacturers recommendations. The Acceptable Solutions should cover only where product abuts other materials and elements to effect weathertightness.

c) Cladding finish colours

There were some concerns raised in regard to setting restrictions on the reflectivity of the finishes on some types of cladding. These included the following:

- It is not going to be possible to control colours.
 - A building could be passed one day and painted the next. More guidance should be sought from cladding manufacturers.
- The quality and application of the finish is more important than the colour
 - Producer statements and warranties should be supplied for all surface coatings, giving the type and manufacturer of product, details of applicator, verification of ability of coating to resist moisture, mould growth and the effects of UV for a minimum of 5 years, and that the application has been done in accordance with manufacturers specifications, including any base coats, under coats and sealer coats.

6. ROOFS

Most comments received regarding roof claddings relate to specific detailed requirements, rather than general areas of concern. These are therefore not appropriate to summarise, as they need to be handled at a detailed technical level, with appropriate specialist advice and amendments made as necessary.

Some of the more general comments are outlined below.

- Need to cover tile systems on plywood roofing for fibreglass, asphaltic or wood shingle tiles.
- The greatest source of claimed leaking problems is damage to roofing by others than roofers. Management of subsequent traffic damage would be a useful inclusion as most leaks caused by subsequent tradesperson or homeowner.
- Roof detailing
 - All roofing details must demonstrate that they can be adequately flashed when they intersect a terminating wall or other vertical surface. Flashings are often complex and problematic. Details should not be part of Acceptable Solution unless a complete solution can be drawn and detailed.
 - Valley gutter linings often corrode long before the tiles need replacing. Secret and concealed gutters must be banned.
 - Many installation details are in direct conflict with successful practices developed over many years. In order to continue successful existing practice then every roof must be presented as an alternative solution.
- Requirements for underlays under clay or concrete tile roofs need to be rationalised.
 - Pitches that require underlays must be consistent. Long rafter lengths may require the addition of underlay to prevent inundation of the roof. Lengths may vary according to tile type, pitch and exposure. Manufacturers' specifications should be consulted for

each situation. Is there a wind speed requirement for underlays under concrete tile roofs?

- The Acceptable Solution only seems to cover butyl rubber and EPDM rubber membranes
 - TAs will assume that these are the only acceptable products. What is the position of other types of membranes on the market such as PVC, Torch on, modified bitumen, and liquid coatings? Will these meet the code once these amendments are in place?
 - Liquid membranes have suffered till now from a lack of application skills. Training courses in application methodology are being set up, so that only trained applicators can purchase and apply these products.
 - Reinforced liquid-applied membranes should be included. They are suitable and durability does not become an issue until the coating has visibly peeled and flaked enough to allow UV access. The 15 year service life of the underlying membrane starts then.

7. WALLS: GENERAL ISSUES

Most comments received on walls also related to specific detailed requirements, rather than general areas of concern. These also are not considered appropriate to summarise, as they need to be handled at a detailed technical level, with appropriate specialist advice and amendments made as necessary.

There were some more general comments some of which are covered below.

a) Wall claddings: general

- All flashing, wrap, and underlay requirements must be standardised to allow for consistent upstands, overlaps and clearances to cladding.
- Concrete masonry should be covered in the Acceptable Solution.
 - Details and specification are needed including heads and sills as these are often poorly detailed, weatherproof parapets without localised runoff over face of block, weatherdrip details to window and door sills, concrete sills with stooped ends and rebates for windows, positioning of damp proof courses around openings, at ground level and behind retaining walls, and prevention of capillary action from ground and connection of slab DPC with wall face water proofing.
- There are technological uncertainties about properties that are needed for wraps in NZ, even after extensive BRANZ studies.
 - While a lot of issues have been settled, full requirements are still not resolved. The use of perforated plastic films must be urgently investigated with regard to condensation problems on the inside face.
- Some further areas need to be covered in the Acceptable Solution
 - Details are lacking on how to flash or construct joints between different claddings
 - Details are required for flashing heads of windows where the principle cladding is brick with a weatherboard section above the window.
 - Joints in rigid sheathing need to be specified for draining to the exterior

b) Airseals

Support for the inclusion of airseals was divided, with some commenting that they were not necessary for all situations and other advocating their use for all applications. Comments included:

- Airseals should be used in all situations

- The primary function of air barriers and seals is to moderate airflows at junctions and inside the wall cavity. Airflows in certain weather conditions encourage significant amounts of water to move along their path. It is therefore important to manage airflow in cavity walls with barriers and seals. Even in low wind areas, air pressure problems can occur. Airseals are cheap and easy during construction and should be normal practice.
- Airseals are not needed in all situations
 - Few houses have leaks with windows due to high pressures. Why not limit this to houses in high wind zones? The requirement is excessive for brick veneer particularly in low and medium wind zones. An air barrier behind gable end sheathing is unnecessary.
- Airseals are too fiddly and won't work.
 - The use of packers or wedges to locate joinery means that in most cases the installer leaves no room for an air seal. Properly designed and fitted flashings are needed instead.

c) Bottom of cladding

The major concerns related to overlap, offset and clearance requirements, and the need to make these consistent for all applications.

There was also comments regarding the need to cover details of junctions between dissimilar materials, and to ensure that provision is made for disabled access at door thresholds.

d) Drained cavities

There were considerable comments on the requirement for drained, ventilated cavities. Most of these were detailed, technical points that will not be covered in this report. There were a number of more general comments as outlined below.

Reservations

- Cavities mean that the building wrap is effectively the external cladding. The wrap will not provide weathertight, windproof protection for 50 years. It is not designed for that purpose and has not been tested for such.
- Cavities can deteriorate due to insects such as mason bees and ants.

More research is needed

- Cavity construction must be thoroughly researched with more objective testing
 - Testing is particularly critical for high wind and exposed situations. If cavities are the wrong size, and not sealed off, they can act as chimneys and draw moisture up, not allowing it to escape. Passive ventilation occurs even when top of cavity is closed.
- Prescribing one designed drained ventilated cavity is inappropriate. The liability will be on BIA if it doesn't work. Owners will be replacing rotten cavities in 5 years unless proper research and testing is carried out.
- Insufficient engineering design input has gone into cavity design in the Acceptable Solution proposal.
 - Where claddings are used as wall bracing over cavities, has the effectiveness been investigated and tested?

More detailed requirements are needed

- The definition of the purpose of cavity must be supplied. It is for back up drainage only and must not be used as a deliberate drainage channel.
- Details are needed of the ventilation at top of cavities as this is a potential water entry point.

- Moist air must be prevented from entering the roof space. Specify where ventilation is required. The batten design needs resolution as cavities should have no horizontal members. They should not be sealed at window heads. Is ventilation required under windows? Will there be spread of flame implications?

Cavities are needed and should be used.

- They are required for all buildings, particularly those with monolithic claddings, to act as the second line of defence in the case of a breach of the outer cladding.
 - All buildings particularly residential housing should be designed to achieve proper water run-off with vented cavity construction. They are also required to allow a wet wall to dry out, but they must avoid moisture uptake into a dry wall.

Cavities should not yet be mandatory

- Cavities should not yet be part of Acceptable Solution. There are too many uncertainties.
 - Cavities must be able to demonstrate that they can achieve requirements without compounding any moisture problems. Ongoing monitoring of representative actual installations is required. Suitable testing programmes need to be developed for understanding the design of cavities, and to set up benchmarks for Acceptable Solution status.
 - The MEWS reports should be used as the starting point. This research shows that a cavity can cause a wall to take up more moisture rather than to dry out, when absorbent claddings are used. The 4 Litre Water Test used by Canadians measures the amount of water that comes out bottom and thus how much has to be dried. Stucco, plywood, fibre cement board all absorb moisture and need specific design in order to be developed successfully.

It is clear from the comments that there is some concern as to uncertainties surrounding the use of cavities, while others appear to see their inclusion as a solution to be widely used.

e) Windows and other penetrations

Most comments on windows and penetrations were detailed, technical points that will not be covered in this report. The more general comments are outlined below.

Improvements are required:

- The aluminium window industry needs to be overhauled and their product improved.
 - Components must be improved so they can be more easily flashed. Jamb flashings should be used for all wall penetrations as well as head and sill flashings for all cladding systems. Water must be shed to outside of the wall cladding, not over top of sill flashings. Systems relying on sealants to keep water out should not be allowed to be used.
 - Current window industry practice gives only 15mm to 20mm overlap onto the cladding. Even this minimal overlap is often compromised during installation. Where window is face sealed onto cladding, it should have a minimum flange of 35mm, and incorporate 2 chambers, one as anti-capillary groove, and other as drainage channel to outside at base.
- Window details and comments should refer to both timber and aluminium windows.
- A sloping sill must have a 15 degree fall to the cavity, extend the fill width of the joinery opening and extend far enough back into the opening to catch any leakage from the aluminium joinery extrusion. Sill tapes are more likely to make timber sweat. Use a sill tray.
- Joinery must not be installed with the flange against the wall framing as this negates the benefit of having a cavity. Details should not show windows in high risk cases fixed back in

framing lines. Head flashings must extend beyond both sides of the window facings by 20mm.

Some requirements are inappropriate

- There should be head flashing exemptions where the window head is well protected by soffits.
- Jamb flashings underlapping head flashings may be misinterpreted for EIFS. The back flange of an EIFS moulding does underlap back flange of head flashing, but entire moulding is installed to run vertically up to terminate above head flashing and to form effective stop end to head flashing. If jamb mouldings are stopped under head flashing, weathertightness problems will be caused.

f) Parapets and balconies

As with other wall areas, most comments on parapets and balconies were detailed, technical points that will not be covered in this report. There were a number of more general comments as outlined below.

- Details should either be more explicit and cover all alternatives, or less detailed so that they allow modification. If detailed, then must distinguish between open timber decks and solid decks.
- Diagrams show only one method of forming balcony/wall junction
 - There should not be only one permitted. The junction should be constructed to direct water clear of the framing, and preferably to the outside face of the cladding system, by using a method consistent with the intent in the drawings.
- While a 100mm separation is usually good, there are instances where a flush threshold is needed for disabled access or other reasons. This can be done successfully, if special attention is given to edge drainage, shelter under overhangs and other protections.
- Some common situations are missing, such as decks with cantilevered joists that penetrate the cladding and spaced timber decking which does not have the same requirements as membrane decking.

8. SUMMARY OF KEY POINTS

Many comments on the proposed changes to E2 were of a detailed technical nature, and these have not been covered in this report as they will be handled at a similar technical level. The main areas of concern in regard to broad issues are:

- ***General issues and scope of proposals***
- ***Weathertightness risk evaluation***
- ***Materials***
- ***Roofs – general***
- ***Walls– general***
- ***Walls– drained cavities***
- ***Walls– windows and other penetrations***
- ***Walls– parapets and balconies***

a) General issues and scope of proposals

Many comments on the E2 proposals covered issues that are outside the scope of the proposals, such as education, research, accountability, consultation requirements, reasons for the current problems, problems connected with other parts of the Code, process issues regarding the

processing of Alternative Solutions and other various matters beyond the scope of the Building Code.

In relation to the more specific general comments, common issues raised were in regard to:

- ❑ ***Improvement is needed in the processes involved when using Alternative Solutions***
- ❑ ***There is concern that the Acceptable Solution is too large and may become an over-reaction***
- ❑ ***The detailed text and diagrams should be in the form of a guidance document***
- ❑ ***There is too much overlap into other clause areas of the Code***

In relation to comments on scope, common concerns raised were in regard to:

- ❑ ***The restriction of the Acceptable Solution to smaller residential buildings***
- ❑ ***The exclusion of some common materials such as***
 - *concrete block*
 - *steel framing*
 - *timber window joinery*
 - *aluminium roofing*
 - *timber roof trusses*
- ❑ ***The situation regarding alterations to existing buildings***
- ❑ ***The need for limits to the floor area as well as the height of buildings covered.***

b) Weathertightness risk evaluation

There were many comments with regard to the concept of evaluating the risks involved for a particular design on a particular site. There are two possible systems of evaluating risk, and there was some confusion as to what was actually proposed by the Acceptable Solution. The proposal was for a simple high/low risk classification that is assigned if a proposed building contains certain features. If the resulting classification is high risk, then the external walls must have a drained cavity.

❑ ***Concept of risk evaluation***

Most comments support the general concept of evaluating the risk applicable to a specific design, but are not happy with any method that is too simplified. Most also considered that the levels set by both systems are higher than is justified for many materials and features.

❑ ***Alternative point-scoring matrix system***

Most prefer the alternate matrix system, although there are differences in opinion on the complexities involved. Some consider that it is too complex with too many subjective parameters that would cause confusion. Others think that more site-specific parameters should be added to the evaluation.

❑ ***Proposed high/low classification***

Few seemed to support the simple split into high and low, as this appears to produce too many erroneous classifications by picking up traditional types of construction that have a long history of successful use.

❑ ***Additional medium risk category***

A number of commentators advocated the refinement of the *high/low* split to include a *medium* category that would prevent inappropriately high classifications. The aim may be to produce a balance between a reasonably simple system of risk evaluation with one that can include extra categories and parameters.

c) Materials

Most comments received relate to specific detailed requirements, rather than general areas of concern. These are therefore not appropriate to summarise, as they need to be handled at a detailed technical level, with appropriate specialist advice and amendments made as necessary.

Common issues relating to materials included:

- ❑ *Flashings have been neglected in recent years with too much reliance on sealants*
- ❑ *Extra information on flashing functions, materials and compatibility is needed*
- ❑ *The aims of considering claddings as systems is good but the list of claddings is too limited, requirements are too vague, there are practical problems, and proprietary products must remain as per manufacturer's recommendations.*
- ❑ *Setting restrictions on colour reflectivity of cladding finish will prove impossible in practice. It is more important to ensure the quality and application of the finish.*

d) Roofs – general comments

Most comments received regarding roof claddings relate to specific detailed requirements, rather than general areas of concern. These need to be handled at a detailed technical level, with appropriate specialist advice and amendments made as necessary.

Common general issues relating to roofing included:

- ❑ *More roof claddings need to be covered in the Acceptable Solution*
- ❑ *The greatest source of claimed leaking problems is damage to roofing by others*
- ❑ *All roofing details must demonstrate that they can be adequately flashed when they intersect a terminating wall or other vertical surface*
- ❑ *Requirements for underlays under clay or concrete tile roofs need to be rationalised*
- ❑ *Concern over the long-term durability and weathertightness of valley, concealed and secret gutter systems*
- ❑ *Concern that many Acceptable Solution details conflict with existing trade practice.*

e) Wall claddings – general comments

Most comments received on walls also related to specific detailed requirements, rather than general areas of concern. These need to be handled at a detailed technical level, with appropriate specialist advice and amendments made as necessary.

Common general issues relating to wall claddings included:

- ❑ *All flashing, wrap, and underlay requirements must be standardised.*
- ❑ *There are technological uncertainties about properties needed for NZ wraps.*
- ❑ *Other wall claddings should be included in the Acceptable Solution.*
- ❑ *Details for dissimilar claddings should be included in the Acceptable Solution.*
- ❑ *Support for the inclusion of airseals was divided, with some commenting that they were not necessary for all situations and other advocating their use for all applications.*
- ❑ *Requirements for overlap, offset and clearance at the bottom of cladding needs to be consistent for all applications.*

f) Drained cavities

There were considerable comments on the requirement for drained, ventilated cavities. It is clear that there is some concern on the uncertainties surrounding the use of cavities, while others

appear to see their inclusion as a solution to be widely used. There were a number of general comments that show this variance in opinion:

- ❑ *Cavity construction must be thoroughly researched with more objective testing as if they are the wrong size, and not sealed off, they can act as chimneys and draw moisture up, not allowing it to escape.*
- ❑ *Prescribing one design of drained ventilated cavity is inappropriate.*
- ❑ *A definition is needed describing the purpose of cavity, along with more detailed requirements.*
- ❑ *Cavities are needed and should be used on all monolithic claddings to act as the second line of defence in the case of a breach of the outer cladding.*
- ❑ *Cavities should not yet be part of Acceptable Solution. There are too many uncertainties, and they could compound moisture problems if used incorrectly.*

g) Windows and other penetrations

Most comments on windows and penetrations were detailed, technical points that are covered in this report. The more general comments are outlined below.

- ❑ *Head, jamb and sill flashings are needed for all wall penetrations in all cladding systems.*
- ❑ *Aluminium window components need to be improved to allow for easier flashing and better overlaps onto the cladding.*
- ❑ *Timber window joinery should be included in the Acceptable Solution*
- ❑ *Systems relying on sealants to keep water out should not be allowed to be used.*

h) Parapets and balconies

As with other wall areas, most comments on parapets and balconies were detailed, technical points that will not be covered in this report. There were a number of more general comments as outlined below.

- ❑ *Details should either be more explicit and cover all alternatives, or less detailed so that they allow modification.*
- ❑ *Provision must be made to allow for disabled access at door thresholds*
- ❑ *Some common situations are missing, such as spaced timber decking and cantilevered deck joists that penetrate the cladding.*

D. REGULATORY IMPACT STATEMENT

A total of 61 respondents commented on various aspects of the Regulatory Impact Statement (RIS). Many of these repeated comments made in relation to earlier sections of the proposal documents, and have therefore been covered elsewhere in this report.

1. B2 Regulatory Impact Statement

Comments relating to the issue of treated timber and Douglas Fir reflected the variation in opinion described in Section B.4 Treatment Levels. The following gives an indication of the range of views expressed by commentators.

a) General

Against change

- BIA has not adequately assessed the additional costs involved, including additional treatment costs, revisions to health and safety practices, revised labeling requirements.
- Consumers will react negatively to unnecessary introduction of chemicals inside their homes. The change could favour the use of competing materials such as steel which are not as environmentally friendly as wood.
 - The RIS underestimates the impact of the proposed changes on the forestry industry as it does not include full environmental costs, impact of slowing on building activity, capital costs for increase in treatment capacity and dry storage. It needs to be withdrawn and replaced with assessment of all impacts including effect on exports and Douglas Fir.

Advocating change

- Changes will achieve objectives of reducing financial risk, health risk, and increasing peace of mind.
- Most structural Pinus Radiata is exported to Australia, and is generally treated at source or destination, prior to use. Treating structural product in NZ is simply replicating what other markets do, and does not create a significant precedent.

b) B2 RIS 2.2 Treatment of timber

- Extensive damage to untreated radiata pine can occur in as little as one year.
- Douglas Fir has been used in NZ for around 50 years in well constructed buildings despite being untreated. It has more heartwood than R-pine, and is the preferred species for roof trusses due to its stability, stiffness, low natural moisture content and natural durability.
- Tin based LOSP products should not be linked generically with Copper based LOSP products. All LOSP products do not have the alleged limitations of Tin-based LOSP.
 - Concerns regarding Tin based LOSP were based on a single trial using products not formulated with additional wax and resin, as is used in current versions of treatment. The test has not been replicated in NZ or Australia.
 - Copper based LOSP is acceptable as H3.2
- The technology exists to treat Douglas Fir.

c) B2 RIS 3.0 Public Policy Objectives

Public expectations would be better met with a durability requirement for claddings that is higher than the current 15 years.

d) B2 RIS 4.0 Feasible Options

4.1.1 Status Quo

- Untreated kiln-dried timber used in inappropriate situations is a failure of the building and regulation system.
 - These areas should be examined rather than forbidding the use of untreated pine.
- A standard system of identification for each method of treatment should be established.

4.1.2 Proposed Solution

- The conservative approach adopted is correct, due to the inadequacy of current building science knowledge.

- Balcony timbers must be H3, but parapets can be same as walls at H1.2. While parapets are risky areas, they do not pose the same safety concerns and can be handled with normal maintenance. They are often extensions of walls, and would otherwise need confusing and difficult detailing if treatment is changed just for the parapet.
- Columns should be included as requiring H3, when these are external and enclosed.
- Clear identification of treatment level and type is very important
- While treatment is needed, the Douglas fir industry should be assisted by encouraging TAs to accept fir framing where risks of failure are low.
- If the issue of wetness and minimising the likelihood of its occurrence was addressed, the need to treat timber would be reduced.
 - Issues in relation to linings, furnishings and general health are not addressed.

e) B2 RIS 5.0 Statement of Net Benefits of Proposal

The RIS does not discuss other changes resulting from the proposals. These may be minor but can add up:

- Increasing the required durability of flues means needing stainless steel.
- The use of wet timber will slow down construction time.
- The use of LOSP is non-compatible with some wraps, membranes and adhesives.
- Additional corrosion protection of fixings will be needed for H3 timbers

5.1 Government

If the Acceptable Solution is limited to housing, this is likely to lead to additional work for TAs when processing other types of buildings

- The number of alternative solutions for housing may also increase if owners aim to avoid treated timber

5.2.1 Timber Suppliers

- A substitution away from Douglas Fir for framing is not a net benefit of proposal.
 - There will be substantial increases in costs to suppliers, customers and consumers.
 - There will be additional financial, international and environmental costs.
- A substitution to other timber will not be a temporary effect.
 - Approximately 6% of NZ's total plantation forest will become unusable within domestic market, and will reduce available timber. A forest is not a supermarket, as owners cannot change stock overnight to meet demand. Changes to the species structure can take up to 45 years.
 - Douglas Fir is specifically grown as a framing timber.
 - There is no other suitable use for this product
 - Export markets are difficult

5.2.3 Others

- The impact of reduced risk could be quite significant.
 - Insurers say that treated timber would be one of their major factors in unwinding the professional indemnity and other risk in regard to weathertightness.
 - Actuaries would then be able to focus on older pre-untreated risks and use that history to calculate risks once treatment is again mandatory.

f) B2 RIS 5.3 Community

Existing owners

There is a lack of consideration of owners who have built since 1996, but who have no problems.

- Property values will drop with potential for legal claims.

5.3.1 New House Purchasers

- New houses with treated timber build up strong chemical odours once closed in. This is likely to continue once the house is occupied.
 - This is not a healthier 'tomorrow's home' for consumers.
 - It is unlikely chemical companies will underwrite any problem that is design and construction based, so a home owner will get no benefit from product warranties.

5.3.2 Employees

- Staff, customers and consumers' families will be exposed to unnecessary risks from chemicals, as 90% of these leave the timber after application.
- The increase in demand for treated timber will stretch supply capabilities, and wet timber will be supplied to merchants. This will increase health risks.

5.3.3 Wider Community

- Heavy reliance, in our plantation sector, on a single species such as radiata is highly risky.
- Unnecessary use of preservatives is not in NZ's best interest.
 - In an environmentally conscious world, we should be promoting chemical free timber.
 - Douglas fir offers an environmentally-friendly option for chemical-free timber.
- Environmental impacts are not minor:
 - Chemically-treated timber requires substantial clean up and waste disposal costs.
 - There is approximately 5% waste in the manufacturing process
 - The costs of waste disposal will be passed to consumers.
 - May lead to increase in steel framing which is contrary to climate change policy.

Other comments arising from answers to questions

- *Identification of other parties affected:*
 - Owners carrying out renovations
 - Solid timber construction has not been considered
 - This would cast doubts on homes built from 1995 to 2003
- *Identification of additional cost impacts:*
 - Outdated existing literature
 - Transportation and handling
 - Workforce protection
 - Loss in productivity
 - More product inventory requirements
 - Environmental disposal
 - Use of wet timber slowing down construction
 - Non-compatibility of LOSP with some wraps, membranes and adhesives
 - Necessity of additional corrosion protection of fixings into H3 timbers
 - Impact of treatment on occupants
 - Impact on value of houses that have untreated timber.
- *Identification of additional cost benefits:*

- Reduced insurance premiums and wider availability of cover, reflecting reduction in costs of failures.
 - There will be less remedial work and less litigation
- *Additional information on impacts*
 - Decay of particle board flooring, mouldings etc. will still occur with treatment.
 - There is currently quite a cost difference between treated and untreated, but that difference should level out with increasing demand over time.
 - If changes are adopted, then it should be rare to need wall and structural repairs. This will mean massive savings for consumer
 - It is likely to be only 10% of cost of repair to an untreated building
- *Constraints on ability to pass costs on to customers*
 - Competition
 - Supply and demand

g) B2 RIS 6.0 CONSULTATION PROCESS

There has been insufficient consultation with the Douglas Fir industry. Investors and private and government research into Douglas Fir will be affected, and changes will effectively wind up the industry in NZ.

h) B2 RIS 7.1 Sources of Compliance Costs

Comments arising from answers to questions

- *Identification of other sources:*
 - Social costs: greenhouse gases involved with manufacture, use and disposal of chemicals, disposal of timber waste.
 - Could be a need for plant upgrades, if boron is the preferred treatment.
 - Timber may be delivered wet, and need time to dry out.
- *Additional parties affected*
 - Owners
 - Builders who will need educating (including owner-builders)
 - Architects & engineers comprehending & designing to meet code.
 - Independent experts for compliance testing

i) B2 RIS 7.2 Estimated Compliance Costs

Comments arising from answers to questions

- *Other costs that should be included in the estimate:*
 - Treatment, transportation and handling
 - Workforce protection
 - Loss in productivity
 - Increased stock of working capital due to more product inventory requirements
 - Environmental disposal
 - Slowdown of economic activity due to costs on consumers.
 - Staff training
 - Solvent emissions and greenhouse gases

j) B2 RIS 7.3 Longer Term Implications

Comments arising from answers to questions

- *Other one-off compliance costs*

- One off cost of alterations to plants to enable use of boron.
- *Other on-going compliance costs*
 - Brick veneer homes will have no additional benefit but substantially more cost.
 - Costs of testing treatment on site will be significant.
 - New capital invested in treatment plants

k) B2 RIS 7.4 Level of confidence

Comments arising from answers to questions

- *Other factors altering level of compliance costs*
 - If one grade is used, costs on site minimised.

l) B2 RIS 7.5 Key compliance cost issues

Comments arising from answers to questions

- *Other issues that should be taken into account*
 - Monitoring and policing costs

m) B2 RIS 7.6 Overlapping compliance requirements

Comments arising from answers to questions

- *Management of overlap with other Acts.*
 - Some existing plants use LOSP-based systems – RMA environmental pressure will direct them to boron.
 - RMA could have a major impact by delaying or preventing treatment plant capital works or plant licensing because of increased chemical load
 - Overlap can be managed as long as the consent process does not lengthen
 - Overlap can be managed with a consistent approach and positive motivation from all parties

2. E2 Regulatory Impact Statement

a) E2 RIS 1.0 Background

- Reports were in late 1980s, followed by an industry conference of 1990 and the setting up of the Cladding Institute.
- Builders should all be registered - with de-registration for inadequate work.
 - Training systems should be limited to block courses supporting apprenticeships
- Leaks will rot timber as cladding system does not allow water to escape and timber to dry out.
 - Cladding manufacturers need to incorporate drying systems if they cannot stop water getting through the cladding to start with.

b) E2 RIS 2.0 Nature and magnitude of problem

- The weatherproofing details should be adopted as a minimum.
 - The use of standard details could save time in drawing preparation and specification writing by providing clear design intentions.
 - Details should be included in all related trades' educational material and apprenticeship training prescriptions.
- TAs and certifiers have not required sufficient details in the past.

- This has led to a culture of approvals without any specification of cladding or details being submitted.
 - Addressing issues of insufficient drainage behind monolithic cladding is critical to finding a long-term solution.
- c) E2 RIS 3.0 Public Policy Objectives**
- Public expectations would be better met with a durability requirement for claddings that is higher than the current 15 years.
 - Improved detailing and more competent tradesmen would meet these objectives

d) E2 RIS 4.0 Feasible Options

4.1.1 Status Quo

- If the cladding system cannot dry timber if it gets wet, then the framing should be treated.
 - However, systems such as brick veneer, with proven track records should remain the same.

4.1.2 Provide detail in the Acceptable Solution

- Extra details in the Acceptable Solution will lead to confusion, non-compliance and more leaky buildings.
 - Instead, upskilling of the industry is needed.
- Arguably, brick veneer could be termed low risk but, because of complexity of buildings and for simplicity, requirements should apply across all building types.

e) E2 RIS 5.2 Building designers / architects

- In principle, more detail in consent drawings is needed
 - However, all increasing demands of Building Act, RMA etc are adding significantly to the costs of small design jobs.

f) E2 RIS 5.3.1 New house purchasers

- 3% increase in cost is high considering that the houses which created awareness of building failure appear to be concentrated in one part of the country.
- NZ house construction is significantly higher than Australian and this will increase the difference.

Comments arising from answers to questions

- *Identification of other parties affected:*
 - Owners carrying out renovations
 - Insulation/wrap manufacturers, who may need to change products.
- *Identification of additional cost impacts:*
 - Existing literature will become outdated.
 - Complex flashings, longer fixings, reduced bracing values.
 - Consequential fixing and bracing costs.
 - Use of treated framing timber
 - Need to change to stainless fasteners where H3 is used.
 - Professional fees - need for more detailing and specific design
 - Extra architectural details and inspections
 - Some claddings will need 3 to 4 more inspections
 - \$1200 is optimistic - sum will be widely variable

- *Identification of additional cost benefits:*
 - Reduced insurance premiums and wider availability of cover, reflecting reduction in costs of failures.
 - There will be less remedial work and less litigation
 - Standard of workmanship will slowly rise.
 - Prescriptive requirements will leave no doubt as to good practice.
 - Cavities may improve acoustic and thermal performance.
- *Additional information on impacts*
 - Increased cost estimate seems too low.
 - Extra flashings are too low - add further \$2500 to \$3000.

g) E2 RIS 7.1 Sources of Compliance Costs

Comments arising from answers to questions

- *Identification of other sources:*
 - One-off education costs.
 - Codes of Practice for trades and training of staff
 - Need for familiarisation of TA staff
- *Additional parties affected*
 - Owners as they will be affected in all instances
 - Builders and developers
 - Builders will need educating (including owner-builders)
 - Architects and engineers who must comprehend and design to meet the new requirements.
 - Independent experts to undertake compliance testing
 - All parties will be affected by compliance costs.
 - Industry will have to absorb some costs but most will be passed on.
 - Training establishments such as polytechs, universities and ITOs
 - Teaching material will need to be updated.

h) E2 RIS 7.2 Estimated Compliance Costs

Comments arising from answers to questions

- *Other one-off compliance costs*
 - Purchase costs of new trade Codes of Practice
 - Education and staff training
- *Other on-going compliance costs*
 - Extra architectural details and inspections that will be necessary
 - some cladding will need 3 to 4 more inspections
 - Education and re-education.
 - purchasing trade Codes of Practice
 - training staff

i) E2 RIS 7.3 Level of confidence

Comments arising from answers to questions

- *Other factors altering level of compliance costs*
 - Project management and supervision costs
 - Consistency of interpretation by Territorial Authorities

j) E2 RIS 7.4 Key compliance cost issues

- Generally reviewing and inspection costs are covered, but there will be extra:
 - architectural details and inspections necessary
 - insurance
 - work for documentation to accompany CCCs

k) E2 RIS 7.6 Steps to minimize compliance costs

Comments arising from answers to questions

- *Additional steps that should be taken*
 - Producer Statements need review or elimination
 - AS must cover all buildings and be flexible
 - Additional research is needed into:
 - cavities
 - drying mechanisms.
 - effect of moisture on insulation and linings

E. COST BENEFIT ANALYSIS

There was a wide range of opinion in regard to the NZIER Cost Benefit Analysis of the proposed changes to B2 and E2. Some commentators considered that the costs of the changes implied by the proposals were over-estimated and the costs of potential repair were under-estimated, while others who opposed the changes expressed the opposite view. Many considered that the figures in the CBA were broadly correct.

The views expressed will be considered by NZIER. However, the following gives an indication of the range of views expressed by commentators.

1. CBA estimates are broadly correct

- Figures are quite conservative, but agrees with basic premise that it relates to at least a 30% saving - consistent with our records of actual costs of repair of decayed timbers.
- Ministry of Education's investigations support the NZIER range of cost increases of 1.8% to 2.5% for the example house.
 - However, MOE would expect to mitigate the additional costs through specific design and alternative material selections and practices
- Failure rates and repair costs - interpretation seems reasonable
 - health cost savings, disruption costs and legal costs not included, but this is offset by effects on Douglas F producers, exports, and environmental costs
 - would be useful to have sensitivity analysis between say 15 to 50% range

2. CBA overestimates costs, underestimates benefits

- The projected cost is \$1000 not \$4000 to \$5000
 - the cost of treating an average house lot of timber to H1.2 is no more than \$800 to \$1,200
 - based on typical volume of 10 to 15 cubic metres - custom treatment \$70/cu m, plus additional margin for a precutter.
 - Costs of treatment expected to drop with volume.
 - There should be no increased cost for designers.

- OSH compliance costs should not increase if good housekeeping is used
- The period used in the report is 25 years, which is understandable but conservative
 - If 50yrs used, then there will be at least an extra 30% of benefits
 - Must not use less than 50yrs, as this is required for the structure under B2

3. CBA underestimates costs, overestimates benefits

- Have serious doubts about the veracity of the data on which the conclusions of these reports are based. The results are highly sensitive to the assumptions made.
 - assumptions are seriously flawed
 - wants reassurance that cost data is based on reliable data.

a) Costs of proposal

- Estimates of additional costs are too low. The CBA estimate of \$4,000 to \$5,000 per house is markedly less than likely increase.
 - Cost is \$25,472 for stand-alone house versus \$5,000 in CBA (16.7% increase in costs not 2.5% as shown in CBA.) They also predict a \$19,089 cost for exemplar apartments.
 - Cost is \$19,089 cost for apartments versus \$4,000 in CBA
- In Southern regions, treated radiata is approx.15% higher than Douglas Fir equivalent
 - with reduced available timber, radiata prices are likely to rise
- For alternately estimated exemplar house:
 - quantity of timber in an exemplar house is 20.33 cubic metres costing \$1720 whereas allowance in CBA is 3.8 cubic metres costing \$266.
 - The cost of constructing a cavity is \$4575 whereas only \$1323 in CBA.
 - Cost of flexible flashing is estimated at \$2237 cf \$370 in CBA.
 - Cost of design of stand-alone house is \$2000 cf \$370 in CBA.
- The CBA is based on small dwellings (70sq.m. unit or 120sq.m. house at \$1,400/sq.m.). In reality, costs will be considerably higher for many people.
 - In Auckland, the normal size will be more like 250 to 400 sq.m. with cost increases accordingly.

b) Failure rates

- Failure rates assumed are excessive, and are more applicable to apartment situations.
 - Rates for stand alone houses should be no more than half those quoted.
 - Houses must be half that of apartments.
- Fails to allow for incidence of failure by cladding type
 - weatherboard will be some 50 times less likely to leak than monolithic claddings, so will therefore have 475 times less incidence of decay than at risk claddings.

c) Repair costs

- Average repair costs used in the CBA are grossly excessive.
 - Believes \$10,000 for standalone and \$5,000 for units.
 - Survey of group builders puts it closer to \$1,500
 - Remediation cost should be \$5,000 not \$60,000
- Larger figures are skewed heavily towards monolithic claddings and large Auckland complexes

- Treatment option won't drop repair costs by much since timber framing is only about \$24,000 for a typical house.
- Any decay damage to weatherboard houses tends to be minor compared with other cladding types

4. Factors missed in CBA

- Health and safety not adequately included - including waste disposal, worker training and safety gear.
 - Treated timber waste disposal will cost \$1.5 to \$2.5 million per year.
- Other costs not allowed for
 - Costs of waiting for timber to dry out before lining - is major advantage of dryframe.
 - Increased mortgage interest repayments for home owners
 - Additional TA costs
 - Impact on investment uncertainty.
 - Unseen costs such as testing systems and supporting alternative solutions
 - The costs to those owning houses of timber that is banned
 - for those with untreated timber but with no leaks.
- Focus appears to be on cost of timber treatment and cavities but there are other proposed changes to E2 and B2 that will add to costs
 - limitation of galvanised roofing and flashings to outside corrosion zones
 - detailed diagrams show more flashings, some of which are complex - all will add to cost. has not included complicated roof details, flashings etc.
 - Many costs not included such as rebating sills, increasing stud sizes on each side of window.
 - Costs to treat all door and window reveals because a pressurised system will carry water on the back of untreated reveals.
- Other increased costs for Douglas fir industry:
 - forestry seed producers and nursery growers
 - forest growers
 - investment in new treatment processes and plants
 - framing is a sawmill product that is below premium grades - without framing, these would be uneconomic

a) Other flaws

- Discount rate should be 10% not 5%, as more reflective of commercial enterprise
 - Discount rate of 5% inappropriate, it should be 8% to 10%.
- CBA assumes that all costs can be passed on but underrates sensitivity to substitute materials
 - no information on price elasticity
- Any proposals to alter NZBC should focus on the problems.
 - As at July WHRS had 1462 houses. 67% of these occurred in multiunit dwellings. This was 0.7% of dwellings built at that time.
 - 99.3% of houses would then have to incur expense without any benefit.
 - WHRS service shows that problem relates to Auckland and/or central city apartments
- No evidence provided that supports the changes proposed by BIA
 - Estimating impacts is impossible without reliable figures for all houses affected

- Assumptions used have a far larger bearing on the result than the use of any real data
- Draft Report should not be used to draw any conclusions unless assumptions can be verified. Verification not likely in immediate future;
- If assumptions cannot be verified, then use an alternative approach "least cost quantitative/qualitative" methodology to compare relative costs and risks, rather than comparing relative benefits with the status quo.
- Assumption by NZIER that any effects on DF industry would be offset by gains in radiata industry is unrealistic
 - real costs will be incurred through impact on DF industry eg redundancies.
- NZIER results are speculative and possibly misleading: NZIER should have:
 - done sensitivity analyses;
 - expressed results as a range;
 - explained impact by house type;
 - Noted that a B/C ratio well in excess of 1 was needed to justify changes.
 - Recommend a threshold B/C or 2.5 be set, not 1.0.
 - Concluded that no conclusions could be drawn until key assumptions could be verified.