Thank you,

Regards
Submission on the Proposed Canterbury Air Regional Plan

Form 5: Submissions on a Publicly Notified Proposed Policy Statement or Regional Plan under Clause 6 of Schedule 1 of the Resource Management Act 1991

Return your signed submission by 5.00pm, Friday 1 May 2015 to:
Freepost 1201
Proposed Canterbury Air Regional Plan.
Environment Canterbury
P O Box 345
Christchurch 8140

A
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Postal Code: 8028
Fax: 

Trade Competition
Pursuant to Schedule 1 of the Resource Management Act 1991, a person who could gain an advantage in trade competition through the submission may make a submission only if directly affected by an effect of the proposed policy statement or plan that:
   a) adversely affects the environment; and
   b) does not relate to trade competition or the effects of trade competition.

Please tick the sentence that applies to you:
✓ I could not gain an advantage in trade competition through this submission; or
☐ I could gain an advantage in trade competition through this submission. If you have ticked this box please select one of the following:
   ☐ I am directly affected by an effect of the subject matter of the submission
   ☐ I am not directly affected by an effect of the subject matter of the submission

Signature: (signed B M Anderson) Date: 1st May 2015
(Signature of person making submission or person authorised to sign on behalf of person making the submission)

Please note:
(1) all information contained in a submission under the Resource Management Act 1991, including names and addresses for service, becomes public information.

B
☐ I do not wish to be heard in support of my submission; or
✓ I do wish to be heard in support of my submission; and if so,
✓ I would be prepared to consider presenting this submission in a joint case with others making a similar submission at any hearing
The specific provisions of the proposal that my submission relates to are: (Specify page number and subsection numbering for each separate provision).

My submission is that: (State concisely whether you support or oppose each separate provision being submitted on, or wish to have amendments made and the reasons for your views.)

I seek the following decisions from Environment Canterbury: (Please give precise details for each provision. The more specific you can be the easier it will be for the Council to understand your concerns.)

Background.

I am by profession a mechanical engineer. I have been a full member of IPENZ for about 40 years. Most of my working life has been in the areas of energy efficiency, renewable fuels, and facilities management (plant operations and maintenance). It is reasonable to say that compared to most I have a high degree of expertise in these areas.

In more recent times I have carried out the installation or conversion of something like 15 or so sets of commercial boiler plant to either wood pellet or wood chip operation. Most recently I had a large hand in the design and construction of the thermal fluid plant which heats Christchurch’s only firewood drying kiln.

I will make four global observations about the proposed Canterbury Regional Airplan (CRAP) before launching into specifics.

1. There are several sections where the same group of rules are presented several times with slight variations for different sets of circumstances. The presentation of the document could be much simplified and rendered more comprehensible by the use of tables and / or simple flowcharts to convey the same information.

2. In a number of areas the airplan moves from environmental science solidly into engineering. It is very clear that in several instances those who have done this are operating outside of their areas of competence. One of the most important responsibilities of any professional is not to operate outside of their own areas of expertise. I shall demonstrate in several of my objections and amendments to the proposed CRAP that many of the “engineering” provisions are ill considered, short sighted, unnecessarily restrictive, and in a number of cases just plain unnecessary. There is a crying need for appropriately experienced engineering professionals to be an integral part of the creation of this airplan.

3. Nowhere in the airplan is there a requirement for regular combustion efficiency checks to be made on industrial or commercial fuel burning equipment. Very efficient burning fuel is almost always the cleanest. Whilst checking the cleanliness of combustion through the use of particulate capture and analysis techniques is complex, costly, and open to error, the measurement of combustion efficiency is quick, easy, and repeatable.

The current practice of granting resource consents with conditions which require particulate testing to be carried out once every few years should be replaced with a requirement to carry out a combustion efficiency check at least twice a heating season; once at the start and once around the middle. This would have a much greater effect on emissions than a very infrequent particulate test.

As a footnote, there are many competing manufacturers of such equipment and a perfectly serviceable combustion kit which will measure temperature, CO₂ and O₂ can be purchased for perhaps $2,000. Such a device should be in every combustion serviceman's tool box. For whatever reason we do not require this in New Zealand and far, far too many combustion service organisations still rely on setting up equipment “by eye”.

4. In the sections dealing with domestic heating there is an underlying belief that the current problems of air quality are caused by an emission standard that is too lax; it needs to be tighter. The NEASQ requires devices to have a maximum emission of 1.5g/kg of fuel burned. ECan unilaterally reduced it to 1g/kg in Christchurch some time ago, and has now reduced it further to 0.5g/kg

This is nonsense. The central issue is that none of the devices in current operation are capable of meeting the requirements of the NEASQ in real life operation by a huge margin. There have been a number of attempts to measure real life emissions. All have come up with different answers ranging from 3 to 50 times the regulated limits. The problem (which has been known for a very long time but which has been unacknowledged by either the MfE or ECan until comparatively recently) is that the standards, AS/NZS’s 4012 & 4013, by which we test wood burning devices are entirely artificial and do not reflect the way in which people actually use wood burners. The standards are not fit for purpose.
This was been very well demonstrated in October 2010 by a piece of work carried out by the Auckland Regional Council. They carried out a series of tests at Spectrum Laboratories on a small group of wood burning devices. Without going into details the modern group of burners averaged at 5.2g/kg, the older group 6.5g/kg. (The full report is entitled Effects of Fuel and Operation on Particulate Emissions from Wood Burners, published by the Auckland Regional Council. It is already in ECan’s possession.)

The need to have “ultra-low emission” devices is almost certainly fanciful. What we need is a testing and approval regime which is a reasonable approximation of reality. Just having equipment in service which really does meet the 1.5g/kg limit in service would be a massive step forward, without introducing the technical complexity and difficulty of attempting to reach a standard of 0.5g/kg for which there is no technical justification.

<table>
<thead>
<tr>
<th>Reference</th>
<th>Detail</th>
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| Page 1-2  | Canterbury Health Estimates  
The quoted death and hospital admission figures are based on modelling; they are not actual measured statistics. In 2015 this is bizarre.

In the 1970’s Christchurch air was very bad indeed. By comparison it is now massively better. Surely this must be reflected in mortality and related statistics? Apparently not because we are constantly relying on modeling to justify our approach to clean air.

Requirement: These very questionable numbers have no place in what is supposed to be an objective document such as the CRAP and should be removed. |
| Page 1-2  | Discussion on PM10  
New Zealand sets limits on PM10 emissions that are unique in the world. We allow one daily exceedance of the 50µg/m³ limit per year. We have no limits for mean long term exposure to PM10’s, nor do we have any short of long term limits for exposure to PM2.5’s.

Reproducing two tables from the Commissioner for the Environment's excellent document, “The State of Air Quality in New Zealand”

1. The WHO guidelines for exposure to PM10’s is 3 exceedances per year. Unaccountable we allow only one.
2. The WHO guidelines limit the long term exposure to less than 20µg/m3. We have have no limits.
3. We have no limits whatsoever on exposure to PM2.5’s which are generally considered to be much more harmful.

In short, the limit upon which the entire CRAP is based upon is narrow, overly restrictive, at the same time as being ineffectual in the protection of people’s health. It is creating gross distortions in the economic provision of commercial, industrial, and domestic heating. |
There lies a deeper challenge to the monitored cleanliness (or otherwise) of our air.

In the case of Christchurch the entire airshed of around 900km² is monitored from two sites only; Woolston and St Albans. The official position is that sufficient modeling work has been done to establish that monitoring

<table>
<thead>
<tr>
<th>Country</th>
<th>PM_{10}</th>
<th>PM_{2.5}</th>
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<tbody>
<tr>
<td></td>
<td>Short-term exposure (daily average – µg/m³)</td>
<td>Long-term exposure (annual average – µg/m³)</td>
</tr>
<tr>
<td>New Zealand</td>
<td>1 exceedance of 50 each year</td>
<td>—</td>
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<tr>
<td>Australia</td>
<td>5 exceedances of 50 each year</td>
<td>—</td>
</tr>
<tr>
<td>European Union</td>
<td>35 exceedances of 50 each year</td>
<td>Less than 40</td>
</tr>
<tr>
<td>United States</td>
<td>1 exceedance of 150 each year</td>
<td>—</td>
</tr>
<tr>
<td>Canada</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Japan</td>
<td>No exceedances of 100</td>
<td>—</td>
</tr>
<tr>
<td>WHO guidelines</td>
<td>3 exceedances of 50 each year</td>
<td>Less than 20</td>
</tr>
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<td></td>
<td>Short-term exposure (daily average – µg/m³)</td>
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<td>Australia</td>
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</tr>
<tr>
<td>European Union</td>
<td>—</td>
<td>Less than 25</td>
</tr>
<tr>
<td>United States</td>
<td>7 exceedances of 35 each year</td>
<td>Less than 12</td>
</tr>
<tr>
<td>Canada</td>
<td>7 exceedances of 28 each year</td>
<td>Less than 10</td>
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<tr>
<td>Japan</td>
<td>7 exceedances of 35 each year</td>
<td>Less than 15</td>
</tr>
<tr>
<td>WHO guidelines</td>
<td>3 exceedances of 25 each year</td>
<td>Less than 10</td>
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in these two locations only is properly representative of the entire airshed.

If I might quote from the Ecan report, “Modeling Wintertime Concentrations of PM10 in Ambient Air, Christchurch and Timaru”

“When comparing the model performance against the two measures of most interest, it is less successful. The PM10 regulations make the number of days in excess of 50 µg/m³ the primary interest, with the second highest daily concentration also highly significant, since the regulations set one day in excess of 50 µg/m³ as the standard.

The model did not demonstrate a consistent performance on predicting the number of days in excess of 50 µg/m³ and mostly overestimated the number between 10 and 25 days, but in the case of Christchurch 2009, underestimating by two days. The model underestimated the second highest concentration in all cases, significantly underestimating in Christchurch 2006, but being within 1 µg/m³ in Timaru 2008. This lack of consistency of results means that the model may not be accurate enough to use for these quantities, which would limit the model’s ability to be used for planning scenarios or policy developments”.

In short, the assertion that measurements from two locations only are sufficient for the entire Christchurch airshed are wrong. Yet measurements at these two locations provide the entire basis for air quality management in Christchurch.

I could go on at length on this subject, but the two messages are:

- The NESAQ exceedance limit of 50µg/m3 once per year is narrow, inadequate, overly restrictive and out of step with international “Best Practice”.
- The method by which we measure actual particulate concentrations in two locations only and then extrapolate the results to the entire Christchurch airshed is unreliable.

**Requirement:** These two issues must be addressed before this airplan, (or any other airplan) is ratified and put into operation.

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**Motor Vehicles**

Motor vehicles as a source of pollutants are talked away. To put it bluntly, this is rubbish.

There may have been changes in our laws which require vehicles to achieve better emission standards. However, there is nothing to ensure that vehicles once on our roads maintain those emission standards. Emissions checks are not a part of our Warrant of Fitness.

It gets much worse.

Below is a graph which shows the growth in diesel consumption. Between 1990 and 2007 our national use of diesel trebled. (The reason that it is apparently “resellers” where the growth is, is that it reflects the change on the part of the main oil companies to divest themselves of their distribution businesses and to contract out the distribution of their products.)

A great deal of that diesel gas gone into road transport. Road transport continues to grow, and the proportion of the vehicle fleet which uses diesel grows. (In Europe diesel vehicles now account for more than half of the total motor vehicle fleet).

Taking a quote from the Canterbury Natural Resources Regional Plan, “According to the US EPA emission factors, the emission rate for PM10 from internal combustion engines can be up to 33 times higher than the emission rate from a boiler burning the same amount of diesel oil”.
As a final note without going into detail, diesel engines are a prime source of PM$_{2.5}$ particulates. This is very well documented. Furthermore, particulates from this source are more harmful than from many other PM$_{2.5}$ sources because of the variety of combustion products carried by the particles.

Requirement: The issue of motor vehicle emissions is a serious shortcoming and must be properly addressed by the airplan. It cannot be fobbed-off. This is an issue that must be carried back to the MfE and Government.

Encouraging the use of wood pellets. Good! But then to go on and encourage gas an electricity in 2015 is grossly irresponsible in that:

- In a low hydro storage year, approaching 50% of our total electricity generation comes from fossil fuels.
- Electricity and gas are significant contributors to our national greenhouse gas emissions.
- Increasing the load on our electrical grid increases the requisite investment in generation and transmission systems.
- New Zealand is a world pace-setter in electricity price rises. In real terms the cost of electricity in NZ has doubled in the 30 years since 1978. That trend continues unabated.
One could go on at length, but to advocate the use of premium fuels for low grade applications such as heating is environmentally irresponsible and is condemning much of the population into heating solutions that are unaffordable.

It is also in breach of the single purpose of the RMA; to promote the sustainable management of natural resources.

**Requirement:** The references to gas, electricity, and heat pumps should be struck out.

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1-6 **Good-Wood**

A nice idea, but critically flawed. The two flaws are:

- No wood merchants have anything like adequate covered storage areas to keep wood dry. Almost all is stored in the open, even wood that has been kiln dried.
- Very few home owners can keep more than a relatively small volume of wood under cover.

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1-6 **Statutory Planning Framework.**

Paragraph one identifies a core problem; the single purpose of the RMA is the promotion of the sustainable management of natural and physical resources.

The promotion of the sustainable management of resources is important if we are to survive in the longer term; however so are other issues; health, people’s right to be warm, affordability (however one chooses to define such a thing), and so on.
**Requirement:** The message has to be carried back to Government by ECAn that the purpose of the RMA needs to be amended to become the promotion of the sustainable management of resources bearing in mind the reasonable but often conflicting needs of the population for warmth, security, and affordability.

**Policy 6.10**

**Best Practical Option.**

This is much too blunt an instrument, as well as being vague.

A better concept is BATNEEC (Best Available Technique Not Entailing Excessive Cost). The notion is relatively simple. It is that the solution to any given problem of emissions has to be related to the size of the emission and the relative cost of dealing with it.

A simple example.

A home boiler of say 30kW emits particulates and a range of other pollutants; NOx, CO, and so on. The practical option (practical in that there is no technical difficulty in doing it) is the fitment of a better quality burner which mixes air with the fuel in such a manner as to limit the formation of NOx, and to equip it with flue gas instrumentation which can minutely adjust the fuel and air entering the burner as load and environmental conditions change. It would also be ruinously expensive, quite out of proportion to the level of pollution and the overall cost of the installation. The total benefit to the environment, given the very small size of the installation would be small.

Take a large factory with a 30MW boiler which emits the same range of pollutants. To require the fitment of a better burner and control gear to that boiler might be costly, but in proportion to the value of the installation and the absolute benefit to the environment, it may not be at all unreasonable.

**Requirement.** Wherever the words “Best Practical Option” appear in the airplan, they should be changed to “BATNEEC, Best Available Technique Not Entailing Excessive Cost”.
Policy 6.18

Avoiding the burning of material in urban areas etc.

As it relates to garden and similar residues, an emphatic NO! Whilst there would be times in the middle of winter that one would not wish to see any significant outdoor burning, for much of the year it has no effect on air quality.

Much worse however is that by banning outdoor burning of garden residues in urban areas we are creating an entirely new and much more lethal hazard, particularly prevalent in the hill suburbs.

By way of example large tracts of land on the hills are gradually becoming overgrown. What used to be grazed tussock and grass hillsides around me on Richmond Hill Road have been subdivided often into very large sections, much of which are inaccessible saving only on foot. By banning the burning of garden residues ECAn has removed the only practical tool available for the control of excessive growth of scrublands in close proximity to dwellings.

Very soon there is going to be a major hill fire which will result in serious loss of property and quite possibly life, (and death by being burned alive is one of the most vile of all deaths). This has been illustrated in recent years on a number of occasions in Australia where undergrowth has been allowed to accumulate for long periods so that when the inevitable fire has occurred, it has been much more intense and dire in its consequences.

Requirement: That urban burning of garden and similar residues be permitted activity at certain times of the year as a means of controlling the excessive growth of scrub, particularly in proximity to occupied areas and particularly in areas where safe access for vehicles and equipment is not possible.
| **Policy 6.3** | Enable the discharge of contaminants from any space heating device that is significant to the heritage fabric of a particular building.  
There appears to be two problems here.  
\begin{itemize}  
\item a) Many heritage building do not use “devices” but open fires. Is an open fire a device?  
\item b) Even if a heritage building is allowed the continued use of its devices (or open fires?) it should still be incumbent upon them to use as smokeless a fuel as is reasonably available. Dry wood of the correct species will burn relatively cleanly even on an open fire. Not so coal or other fuels.  
\end{itemize}  

**Requirement:**  
a) the meaning of the word “device” be clarified in relation to heritage buildings, and,  
b) that even though the continued use of their “devices” is permitted they are required to use as smokeless a fuel as is reasonably available. |
| **Rule 7.4** | **Paragraph 1**, I would suggest that commercial premises be added to industrial or trade. Conceptually there is no reason why some sort of waste or contaminated material disposal operation, or simply the use of “difficult to burn cleanly” fuels should not be carried out on or in conjunction with commercial premises.  
A good example could be (say) a very large sports centre which is heated with a boiler which is fired by demolition materials. Provided the boiler controls and emission reduction equipment are sufficient to the task, there is no reason why this cannot be carried out cleanly and safely.  
Failure to recognise that this possibility exists on commercial premises is unnecessarily restrictive.  

**Requirement:** That the work Commercial is added in with industrial and trade. |
| **Rule 7.4** | **Item 13.**  
This may well prevent the future establishment of a refuse to energy plant. These are commonplace in many parts of the world, often enough set up on the site of existing refuse disposal facilities for good logistical, infrastructure and town planning reasons.  

**Requirement:** A re-wording is required to the effect that the operation of a properly designed combustion facility would be a notified consent. |
| **Rule 7.22** | This needs to be widened from just wood pellet fuel to include wood chip. The combustion characteristics of wood chip are very similar to wood pellets. Well graded wood chip can be used interchangeably with wood pellets.  
Attached with this submission are the particulate emission results of a large scale trial on the boilers at Cashmere School which normally operate on wood pellets. The results operating on either fuel are virtually indistinguishable.  
The measured emission rates are also far, far below those which are required in rule 7.22  

**Requirement:** Rule 7.22 shall include wood chip as well as wood pellet. |
| **Rule 7.26** | This rule is senseless when one considers that the same engine run in an automotive application has no restrictions at all upon it. |
| **Rule 7.32** | Please see my comments in relation to 7.4. There is no reason why bitumen or other waste material burning within a waste or transfer station or area should not take place, provided it is done with the correct equipment.  

**Requirement:** A re-wording is required to the effect that the operation of a properly designed combustion... |
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<th>Section</th>
<th>Description</th>
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</table>
| 7.36 | Discharges to air from grinding, cutting etc.  
The way that this rule is written there is no bottom limit to the size of the grinding operation. It even covers hand tools!!!!!  

**Requirement:** This rule be re-drafted to include some measure of size in its applicability. It might be expressed as the kW rating of the primary grinding motor, perhaps the volume of compressed air consumed. |
| 7.42 | Item 2  
Discharges of odour or dust beyond the boundary of the property of origin.  
The level of dust emission needs to be quantified. At present it is an absolute. On that basis there will always be “some” dust which crosses a boundary. Surely the intent is not to cover relatively trivial emissions?  

**Requirement:** This rule requires more accurate definition of how much dust at the property boundary constitutes a nuisance, in much the same was as we define noise levels. |
| 7.47 | Item 6 Containment in the immediate area of the blasting.  
This can be impractical. There is always dust associated with dry blasting. A good example that I observed a few days ago was the electricity pylons at Ferrymead being abrasive blasted by an operator at the top of the pylon. Clearly it is the only practical method to prepare the pylons for painting. It would however be in breach of this rule.  

**Requirement:** Item 6 be re-written to minimise the escape into the environment to the extent reasonably practicable. |
| 7.47 | Item 10  
You have ruled out one of the most common and useful of all abrasives; aluminium oxide (“Carborundum”)  

**Requirement:** This list of acceptable blasting media requires amendment in consultation with experts in the field. |
| 7.76 & Schedule 7 | Rule 1, the requirement to install in accordance with schedule 7.  
Absolutely NOT.  
Let us be absolutely clear. Installing a wood burner (as they are currently understood) is a very simple task indeed. The burner itself is supplied complete and finished by the manufacturer.  
The installation requires:  
- Placement of the burner upon a non-combustible hearth.  
- Maintenance of clearances from walls  
- A flue of certain minimum dimensions and height which passes safely through the ceiling and roof of a property.  
On inspection (which is a requirement of the associated building permit) all of these items are checked. It takes 5 minutes.  
I would suggest that very, very few emission problems are caused by faulty installation. I would also suggest that if the installation of wood burning devices is like so many other building instillations, the errors are as likely as not to have been committed by approved tradesmen. All we are doing with this rule is creating another costly “closed-shop”.  

This is an abuse of ECan’s authority and the entire matter should be left as a matter to be inspected by a building inspector on completion of installation. Indeed, the most likely consequences of an installation error
are not excessive emissions but danger to the house !!!!!

A second, but closely related issue is that the operation, maintenance, and installation instructions supplied with many wood burning appliances are completely inadequate. Typically a manufacturer has one small booklet supplied with each appliance which covers everything for all appliances in the range.

During the development of the Canterbury Method I repeatedly made it mandatory for approval of an appliance that the operating and maintenance instructions supplied with a burner must be assessed for completeness, comprehensibility, and practicality.

On every occasion that provision was removed by ECan editing staff without explanation and is still not a requirement.

**Requirement:** 7.76 item 1 be deleted, schedule 7 Part 1 be deleted, and the Operation, Maintenance, and approval of the Instruction manual supplied with each burner be a part of the approval process.

<table>
<thead>
<tr>
<th>7.76 Item 2</th>
<th>Maximum moisture content less than 25%</th>
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<tbody>
<tr>
<td>No. This limit presupposes that all wood combustion devices are the same. They are not.</td>
<td></td>
</tr>
<tr>
<td>What we need (given the near impossibility of supplying and storing wood in large quantity at a 25% or lower moisture level across a whole city) is the development and widespread adoption of devices that are tolerant of much higher moisture levels.</td>
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**Requirement:** 7.76 Item 3 be re-worded to “a moisture content no greater than 25% or that which is specified by the device manufacturer should the device be capable of burning fuels with a greater moisture content.

| 7.81 | See comments relating to Policy 6.3 |
| 7.83 | See comments relating to 7.76 and Schedule 7 |
| 7.85 | What is meant by an “older style” enclosed burner? This requires clarification. |

<table>
<thead>
<tr>
<th>7.86, 7.87, 7.88, Item 3a</th>
<th>15 years from date of installation.</th>
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<tbody>
<tr>
<td>Absolutely NO !!!! This is an abuse of power on ECan’s part and puts a treble underline under point 2 of my introduction. There is nothing which is technically justifiable, magical, or significant about 15 years. (I believe it came in the past as a means of removing the first generation of wood burners, some of which were not particularly clean burning.)</td>
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<tr>
<td>It is also a needless expense for homeowners, especially bearing in mind that many wood burners are installed in low income households.</td>
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<tr>
<td>Apart from that there is no more valid reason to require removal after 5, 10, 15, or 30 years.</td>
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<tr>
<td>It comes down to the maintainability of the device and the durability of its original construction. Most devices are endlessly maintainable. There are certain components (air distribution tubes, refractory linings, internal brackets, door seals and such) which require periodic replacement. Many of these components will require replacement two or three times in just 15 years.</td>
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<tr>
<td>Again, two issues. The first is the issue of inadequate maintenance instructions as described under section 7.76.</td>
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<tr>
<td>The second is durability. Nowhere in any of the testing and approval standards for wood burning devices in New Zealand is there any requirement for durability. Compare this with the European standard EN303-5 which covers most appliances used in Europe and which contains comprehensive requirements for construction standards, materials, and durability.</td>
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<tr>
<td>I append with this submission a report which I produced for an insurance clam made with AMI which was made on a wood burner less than 2 years old. I think that if you take the trouble to read it, it illustrates all of my points admirably.</td>
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### Requirement:

a) That the 15 year rule be deleted and replaced with a responsibility on the part of the owner to properly maintain a device or face its removal.

b) That integral to the new testing and approval methods under consideration by ECAn at present should be guidance and requirements for durability.

c) That the approval of simple, clear, and understandable maintenance instructions specific to the particular burner in question be an integral part of the overall burner approvals process.

### Schedule 6

**Testing for Particulate Matter in Exhaust Gases**

I cannot comment on the correctness (or otherwise) of the testing methods specified but I sincerely hope that the methods have been discussed with individuals and organisations who routinely use these tests and are competent to confirm the suitability of the test methods.

I also refer you to item 3 at the beginning of my submission in relation to regular combustion efficiency testing.

### Requirement:

a) That the specified test methods for larger combustion plant be confirmed as appropriate with a selection of competent individuals and testing laboratories.

b) That regular combustion efficiency checks be required on all non-domestic combustion plant above a given size. (Perhaps 200kW might be a place to start the discussion.)

### Schedule 7

**Installation, Registration, and maintenance of domestic solid fuel burners.**

Part 1.

NO!!! See the response to Rule 7.76

### Schedule 8

**Space Heating Appliance Auditing Process**

This section is seriously deficient and requires revision by an engineer competent to do so. (See Background, point 2.)

In particular:

- “Water booster” is undefined.
- Dimensioned and tolerated drawings of the device showing its general arrangement and assembly are required.
- Those elements and dimensions critical to its safe and clean operating should be defined.
- Normal manufacturing tolerances need to be indicated, along with tolerances on elements of the design critical to its safe and clean operation. (Many dimensions are irrelevant in this respect).
- The materials used for each component shall be clearly and uniquely identified and shall have a stated design life for the application in which they are being used. (By way of example, the firebox may be constructed of a grade of steel which has (say) a 30 year design life in ordinary domestic operation. Exactly the same grade of steel used for (say) the air distributor tube might only have a design life of 2 years.
- Minimum design lives must be specified for a device. I would suggest that the design life for the basic unit “box” should be 30 years, with some componentry of a lesser life. Those components in direct contact with fire and very hot gases might have a design life of as little as 5 years.
- The device must be manufactured under a documented quality assurance system. That QA system shall be audited by ECAn on request, or at such times as ECAn might have reasonable reason to believe that it is not being followed.
- Failure to be able to demonstrate that the QA system is being followed might result in a series of consequences to the manufacturer ranging from a simple admonishment and more frequent audits, through to compulsory checking and repair of units in the fields. In an extreme case it could require the replacement of all units in the field and withdrawal of approval for the device.
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<tr>
<th>Requirement:</th>
<th>That the Technical Report and Audit, and 5 Yearly Audit sections be scrapped and re-written along the lines stated above by persons competent to do so.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Schedule 8</strong></td>
<td><strong>Enclosed Burner Design</strong>&lt;br&gt;<strong>Item 2</strong> is unachievable. Some of the componentry in even the simplest of current devices can be modified in minutes with very simple tools.&lt;br&gt;<strong>Item 5</strong> is vague. The technology must be designed to be effective for the device’s life, but what is that life to be? Even that is meaningless because (as in all equipment from motor cars to enormous industrial plant) there are components which by their very nature have a finite life much shorter than any notional life of the entire machine.&lt;br&gt;What is important is that reasonable minimum acceptable design lives are defined and that clear and simple maintenance instructions are provided with the device which identify all of the componentry which requires regular attention or replacement, and describes in clear and simple words how this is to be achieved.&lt;br&gt;Again, please read the attached insurance investigation report which demonstrates the needs for this very clearly indeed; with photographs!</td>
</tr>
<tr>
<td><strong>Schedule 8</strong></td>
<td><strong>Particulate Measurement</strong>&lt;br&gt;The NESAQ is written entirely around PM10 concentrations.&lt;br&gt;All of the device test methods look at total emitted particulates. There is a critical omission in all considerations to date in that it is very important to attempt to separate particles above PM10 from those below.&lt;br&gt;If the regulations are written around sub-10 micorn particulates then we should be making real attempts to measure these in our testing.&lt;br&gt;&lt;br&gt;<strong>Requirement:</strong>&lt;br&gt;That urgent work be undertaken by ECan to identify a practical methodology for the accurate and direct measurement of sub-10 micron particles in a device’s flue.</td>
</tr>
</tbody>
</table>
Report on the Damaged Log Fire

of

XXXXXXX
Linwood
Christchurch.

By Brian Anderson, BE, BSc, MIPENZ
September 2012
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1. Background

This report has been prepared at the request of YYYYYYY of AMI Insurance.

Following the collapse of Mr & Mrs XXXXXXX’s brick chimney in the February 2011 earthquake, an “AAAAA” log burner was installed by the EQC as a replacement heating appliance.

The unit performed satisfactorily after its installation on the 29th April 2011 until the 25th June 2012 when it was noticed that the front air-tube was burned through. Two days later on the 27th it was also noticed that a small crack was developing in the front bottom right hand corner of the firebox. The installers, BBBBB, were telephoned the same day. They in turn contacted the manufacturers.

After discussions with Mrs XXXXXXX, the manufacturers agreed to remove the unit to their workshop for repair. Confusion erupted when they arrived and discovered that it was a fire with an integral water heater. They were not prepared for that eventuality.

At some point it became apparent to the manufacturer that the air tube was burned out. They stated that the warranty was voided because of failure on the part of the owner to carry out proper maintenance.

AMI, Mr & Mrs XXXXXXX’s insurer are declining liability on the grounds that the log burner did not meet the requirement of the Building Code in that it was insufficiently durable and was therefore unfit for purpose.

In the middle of this are Mr & Mrs XXXXXXX who have a log fire which has failed prematurely.

2. Photographs

<table>
<thead>
<tr>
<th>The log fire as installed at 48 Wyon St.</th>
<th><img src="image1.jpg" alt="Image of the log fire as installed at 48 Wyon St." /></th>
</tr>
</thead>
<tbody>
<tr>
<td>The fire box crack is in the centre of the grey sealant which has been supplied by the installer to seal the crack.</td>
<td><img src="image2.jpg" alt="Image of the fire box crack" /></td>
</tr>
<tr>
<td>Description</td>
<td>Image</td>
</tr>
<tr>
<td>----------------------------------------------------------------------------</td>
<td>-------</td>
</tr>
<tr>
<td>A blow-up of the above photograph. The crack is clearly visible running from the left into the centre of the grey sealant.</td>
<td><img src="image1.jpg" alt="Image" /></td>
</tr>
<tr>
<td>The other side of the crack where it has migrated into the door frame. It is clearly visible in the corner.</td>
<td><img src="image2.jpg" alt="Image" /></td>
</tr>
<tr>
<td>The original burned-out air tube.</td>
<td><img src="image3.jpg" alt="Image" /></td>
</tr>
</tbody>
</table>
3. The Instructions

A set of instructions entitled, “Installation and Operating Instructions for the following AAAAA Models……” was supplied with the log burner. It is a generic set of instructions covering 15 different models of AAAAA units, some log burners, and some multi-fuel.

In installation instructions are reasonably concise, covering as they do a multitude of possibilities.

The operating instructions are adequate.

The maintenance instructions as they relate to the inspection of “consumable” componentry are very general, stating only that baffles, bricks, air tubes, the glass door and sealing ropes should be inspected. There are no diagrams showing where all the components are, how they are arranged, or photographs illustrating what is acceptable and what is not.

The primary weakness of the manual is that it is trying to cover 15 models of burner in a single document.
4. Building Code Requirements

The Building Code, clause B2 in the Acceptable Solution B2/AS1, table 1, requires all free standing heating appliances to have a durability of not less than 5 years.

5. Warranty

The warranty for the log fire is odd.

It states in bold letters at the top of the page that the firebox has a warranty of 15 years for log burners.

It goes on with words to the effect that if a defect occurs in the first year of operation, that the firebox is then covered by a further 9 years warranty against defects during normal use.

If a claim is made after the first year then the firebox is covered for a further 5 years warranty only.

In short, provided you do not claim you, have up to a 15 year warranty. If you claim within 1 year of purchase your warranty reduces to 9 further years (a total maximum possible warranty of 10 years), and if you claim after 1 year, your warranty is for 5 more years only (a maximum possible warranty period of 6 years).

This warranty is both difficult to make sense of and extremely misleading. It is probably worthy of reference to the Commerce Commission.

A copy of the warranty is included as an appendix.

6. Observations

1. The fire was installed on the 29th April 2011. The firebox crack was noted on the 25th June, 2012, 14 months later. The fire cannot have operated for more than 8 months in that period; 5 months in the remainder of 2011, and 3 months in 2012.

2. The front air tube burned out, from new, in 8 months or less of actual operation. The makers claim that the air tube is a consumable item. The air tube is indeed in the harshest environment in the fire, being in the hottest part of the firebox and feeding into the fire, cool, fresh oxygen-rich air. Given the temperature and the highly corrosive environment it is not good enough to manufacture it from ordinary mild steel and expect the owner to replace it regularly (at a cost of $53/time). It should be made from a much better alloy capable of resisting corrosion for long periods at elevated temperatures. There are many commonly available grades of steel or stainless steel which are more than adequate to the task and which would add virtually nothing to the cost of the log fire. Many competing fires do just that. (The writer replaced his own fire tube in a much larger Yunca “Wegj” only three weeks ago after 5 years of operation, at a cost of $64. It is a much longer and larger tube in stainless steel.)
The Building Code states that free standing heating appliances shall have a durability of at least 5 years. It is reasonable to expect that this covers the consumable items also. It is certainly implicit that consumables shall have as long a life as is reasonably and economically practicable.

Something less than 8 months operating life for the air tube is unreasonable and unacceptable. (It is worth noting that to see the air tube, one has get down on one’s knees and peer upwards inside the firebox. It is doubtful that many owners would know what the air tube is, much less where to find it. In this respect the operating and maintenance instructions are no help whatsoever.)

3. To be fit for purpose, the log fire must be capable of withstanding component failures and such like for a period of time without its structure being compromised. The claim that operation with a burned out air tube has lead to the failure of the firebox in such a very short time implies that the durability of the firebox is inadequate. It is also an unreasonable claim.

4. The door frame crack has occurred where one might reasonably expect it to; in the bottom corner. The web of metal between the frame and the side of the firebox at this point is very slim. It is also the coolest part of the firebox. Above it is the hottest part of the firebox, a part which expands and contracts every time the fire is stoked, the air supply increased or decreased, or as the fire burns down. The web at the bottom of the door frame is subject to significant stresses and metal fatigue.

The following table illustrates the amount of differential expansion between the top and bottom of the door frame for various metal temperature differences between the top of the stove and the bottom of the door frame:

<table>
<thead>
<tr>
<th>Temperature difference (°C)</th>
<th>Expansion of the top, relative to the bottom of the door frame, (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>0.7</td>
</tr>
<tr>
<td>200</td>
<td>1.3</td>
</tr>
<tr>
<td>300</td>
<td>2.0</td>
</tr>
<tr>
<td>400</td>
<td>2.6</td>
</tr>
<tr>
<td>500</td>
<td>3.3</td>
</tr>
</tbody>
</table>

It is this mechanism which has driven the firebox failure. It is entirely possible that many other log fires of the same design are failing similarly. It is possible that on this occasion the crack is a result of a manufacturing defect and that differential expansion has accelerated its growth and the failure of the firebox, but that is not clear.

The failure itself is not particularly serious. It will admit a minute quantity of air to the fire through the crack and it will (presumably) grow in length with time until it peters out into the main body of the firebox.

It does not alter the fact that such a crack should not happen.
Repair is a relatively simple process of grinding the crack out and re-welding the firebox, but I would expect the crack to reappear.

7. Recommendations & Conclusions

1. Grind out the crack and re-weld the firebox. This repair is only acceptable if the manufacturer is prepared to guarantee the firebox for the remainder of the original 15 year warranty. Should the crack reoccur in this position (or any other location), then the whole fire shall be removed and replaced with a new unit at no cost to Mr & Mrs XXXXXX.

2. Replace the air tube material with something much more resistant to corrosion at elevated temperatures. Mild steel is inadequate and does not meet the reasonable durability requirements of the Building Code.

3. Improve the Operating and Maintenance Manual by producing a manual specific to each model of log burner and by adequately illustrating all of the maintenance tasks which the owner is expected to undertake. The present manual is inadequate.

4. Finally, I cannot conclude that mal-operation or inadequate maintenance by the owners in such a very short space of time can lead to the failure of this fire.

Brian Anderson

7th September 20
Appendix

15 Year Firebox Warranty - Wood fires
10 Year Firebox Warranty - Multi-Fuels
1 Year Parts Warranty - All Fires

Your fire is warranted for a period of 1 year to the original purchaser, from the date of purchase, against defective materials and workmanship which includes the firebox and all parts.

If a part defect occurs, return the part to the retailer or directly to along with a copy of the retailers receipt and the part will be replaced at no cost.

If a firebox defect occurs, either contact the retailer of and it will be repaired or replaced at our discretion with all costs covered.

This warranty does not cover damage caused by mishandling, misuse, failure to follow the manufacturer’s installation and operating instructions, or work done by others, such as installers, or plumbers etc. The manufacturer shall not be responsible for site conditions such as insufficient draught, downdraughts, or routine servicing and adjustments.

Damage caused by the failure to replace consumables like air tubes, baffles and fire bricks may void the warranty.

Your firebox is then covered by a further 9 year warranty against defective materials and workmanship during normal domestic use.

In the case of a claim after the first year, this warranty covers the replacement or repair at the manufacturer’s discretion and includes freight, painting and all required refurbishment but does not cover the cost of having the appliance disconnected and reconnected.

It shall be the owner’s responsibility to have the fire available and ready for pickup from onsite or another suitable location or deliver the fire to either the dealer from whom it was purchased or directly to.

Your ONLY is then covered by a further 5 year warranty on the fire box against defective materials and workmanship during normal domestic use.

In the case of a claim after the first 10 years, it shall be the owner’s responsibility and expense to deliver the fire directly to and the reinstalation after any repair has been made. will repair and refurbish the fire, including painting as necessary and deliver the back to the customer.