# THE IMPORTANCE OF CONTROLLED FIXATION OF CCA-TREATED WOOD -- A TREATER'S VIEW

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## 1. Introduction

For many treated wood products, CCA is the most widely used wood preservative in Canada today. The use of CCA in treated wood products is growing as other wood preservatives are slowly being phased out. The phasing out of most wood treatments in the past has been due mainly to environmental issues such as poor environmental stewardship, obsolete plant design, and site contamination from preservative leaching. This has led to a negative perception of the treated wood industry in the eyes of the general public.

I feel that fixation and environmental control are vital to the continued success of the wood treating industry. I also believe that treated wood really can and does save trees. If the treated wood industry is to survive in the future, changes must be made today. These challenges can be met with continued efforts from all of us and joint support for the research of new methods and designs. The costs of this will be far less than the costs of environmental clean ups and plant closures in the past have been.

Accelerated fixation is the name given to a process in which a permanent bond between CCA treating chemicals and wood cellulose is facilitated in a very short period of time. The accelerated fixation of CCA plays a vital role in our treating process at Guelph Utility Pole, and we know its benefits easily outweigh its costs. In this presentation I will attempt to clarify some issues surrounding fixation and demonstrate some of the benefits derived from it that some may not realize.

## 2. Why Accelerated Fixation?

Here are a few reasons why I feel that accelerated fixation must be implemented. The future of the wood treating industry will depend on it in a future climate where only environmentally safe, recyclable and high quality products will be accepted by our customers.

Many studies show us that ambient temperature fixation can take weeks to complete, even in the most favorable summer conditions, and in the winter months it stops. Accelerated fixation will speed up the treating process and allow treating plants to offer quick turnaround times. Leaching during the fixation process, in yard storage,

transpiration, etc. will be minimized through accelerated fixation. Such leaching can lead to expensive clean-up costs and major liability problems for anyone involved.

Accelerated fixation makes the day to day handling of CCA treated wood safer. CCA is very mobile in most soil conditions and can easily contaminate wells, water ways, run off basins and adjacent properties. This may lead to many unknown costs and legal problems in the long term.

I believe that accelerated fixation makes CCA treated wood a safer, higher quality product which will last longer in service. This will give the satisfaction of knowing you're doing your part in protecting your business interests as well as our environment for future generations.

Unfortunately many wood treaters do not seem to understand what the true condition of their site is and how it will affect them in the future. Gone are the days of "hit and run businesses" in wood preservation. Environmental laws are getting more stringent every day, and people can no longer walk away from the issues.

### 3. Steam Fixation Chamber Construction

To construct a steam fixation chamber, there are some things you will need to be aware of. First you must understand that the environment in the chamber will be extremely humid. This makes it corrosive to many materials. The presence of CCA in the chamber adds to this problem.

The first thing to do when designing a fixation chamber is to allow for containment of the CCA runoff. The best method of doing this is to incorporate a liner under the concrete floor. A high density polyethylene liner (60 mil.) with plastic welded seams is an excellent choice. There are many companies that supply and install these liners. The use of a liner and a thin, low cost top sealer on the concrete floor will provide a containment system that will outlast and cost less than last a thick top coating without a sub-liner. In most cases, top liners fail in a short period of time and require constant repairs.

The next step is wall construction, insulation, vapor barriers and interior lining. For the purposes of efficiency you should install enough insulation to achieve at least an R40 rating or better. A good idea is the use of a moisture resistant foam insulation such as Styrofoam SM Blue on the interior and common "bat" insulation on the exterior. A good vapor barrier on the inside of the inner insulation is important in keeping the insulation dry.

Next comes interior lining materials. The best material for this is stainless steel however aluminum can also be used, though no one can say how long it will hold up. Just about any dry kiln can be converted to a steam fixation chamber while retaining its ability to be

used as a dry kiln. The only problems encountered may be the corrosion of construction materials and containment of drippage.

The necessary internal components of a steam fixation chamber are as follows. First a low pressure steam boiler large enough to supply adequate steam to the chamber will be required. Compete distribution through a steam header with spray nozzles allowing for even distribution of the steam will also be required. The steam will then need to be fan-blown through a duct or baffling system and forced through the wood. The fan system must have the ability to overcome the pressure drop encountered as it passes through the wood load. For good fixation, velocity of the saturated air must be sufficient to keep the wood at the dew point at all times. If not, the fixation process will be negatively affected.

If drying of the wood occurs in the early stages of fixation, the quality of fixation can be adversely affected. In most situations, drying in the early stages of fixation will wick excess CCA to the surface of the wood and cause surface deposits and staining. High levels of copper may be found near the surface and go undetected by current fixation analysis procedures. This is why it is important maintain ideal conditions in a fixation chamber.

In order to maintain proper fixation conditions you will need a reliable control system that can acutely read the kiln wet and dry bulb temperatures. When set up properly, the wet bulb temperature should be very close to the internal wood temperature. Either suitable dry kiln controls or more specialized fixation kiln controls may be used to maintain the required conditions. Controlling the conditions and keeping the wet and dry bulb temperatures as close as possible (at the highest possible relative humidity) will give the best quality of fixation using this method.

To keep a fixation chamber running effectively year round, recording of the wet and dry bulb temperatures for each fixation kiln charge is a useful feature. Fixation charge charts are also an excellent attachment for treating reports as evidence that the wood has undergone an accelerated fixation process. The controllers used at Guelph Utility Pole electronically record and store information for several weeks and can be monitored, downloaded and controlled from a remote location by computer. Recording controls provide very useful information in optimizing kilns for different loads and seasonal adjustments.

We also have the ability to dry wood in our fixation chamber through the use of a specially designed dehumidification system. This equipment allows us to dry without venting to the atmosphere and speeds up our drying process as we don't have to move the wood to a dry kiln following fixation. The system also allows us to recover energy from the chamber during drying and use it in other areas of the treating plant.

## 4. Guelph Utility Pole: A Fixation Case Study

Guelph Utility Pole has been in wood treating industry for 18 years. I have been involved with the company for 10 years during which I've been directly involved with a continuous stream of improvements. The greatest portion of improvements have taken place over the past 5 years following a change of company ownership and chosen direction.

Following the change of ownership several issues came to our attention after hearing the concerns and complaints of local residents.The company had its largest ever inventory of PCP treated poles at the time of sale. This brought about complaints of odors from nearby residents along with intensive site monitoring. These issues raised several questions concerning the future direction of the company. There were also environmental concerns being raised by our pole purchasing customers, prompting a request that we convert our PCP pole production to CCA treatment over a five year period.

At this time we had an under utilized CCA treating plant and realized that we would need another new plant to handle the increase in CCA production. From this arose many concerns of our site becoming contaminated by CCA leachates. I felt that there must be a way to prevent preservative losses from CCA preserved wood after treatment. After a good deal of research I came across some information on CCA fixation. I was told that I should talk to a Dr. Paul Cooper at the University of Toronto. Soon after talking to Paul we began a joint research project on the accelerated fixation of CCA. Within a short period of time I converted a small dry kiln at the university to a fixation testing chamber. The results of our testing were very successful and I began construction of a full-scale prototype type within 6 months of the initial testing.

At the same time we built a second CCA treating plant and a new covered transfer pad. We met and exceeded all current design recommendations. Until this time CCA production at the plant had been low, however we were seeing increased levels of CCA components at monitoring points around the sight. The company hoped that our efforts in containment and fixation would allow for increase CCA production while at the same time avoiding an increase in levels of contamination at the plant site.

Guelph Utility Pole has an environmental consulting company retained to monitor our site, aside from monitoring already conducted by The Ontario Ministry of Environment and Energy. Our environmental consultant must, by law, report their findings to The Ministry of Environment and Energy. Once this information is reported it becomes public information. Often times our residential neighbors would see testing results before the company did. Prior to our change in production processes we had several monitoring points around the site and some of their readings for contaminants were on the increase.

Before installing a fixation system our production level in CCA was approximately 375,000 cubic feet of wood per year. Today we treat approximately 1.2 million cubic feet of wood per year with CCA and store about 700,000 cubic feet at our site. The majority of this wood is a thick sapwood species. With the increase in production levels and large volume of fixed treated wood in storage our site is in better condition now than it was before we began accelerated fixation.(see Figure#1)

Had we not made accelerated fixation a priority when we did we could be facing very serious site contamination at this time. Instead we now feel we can safely treat with CCA for many more years to come. I am certain that if we used the cost of a site clean up to calculate the payback of our fixation system our payback would have been a few years or less.

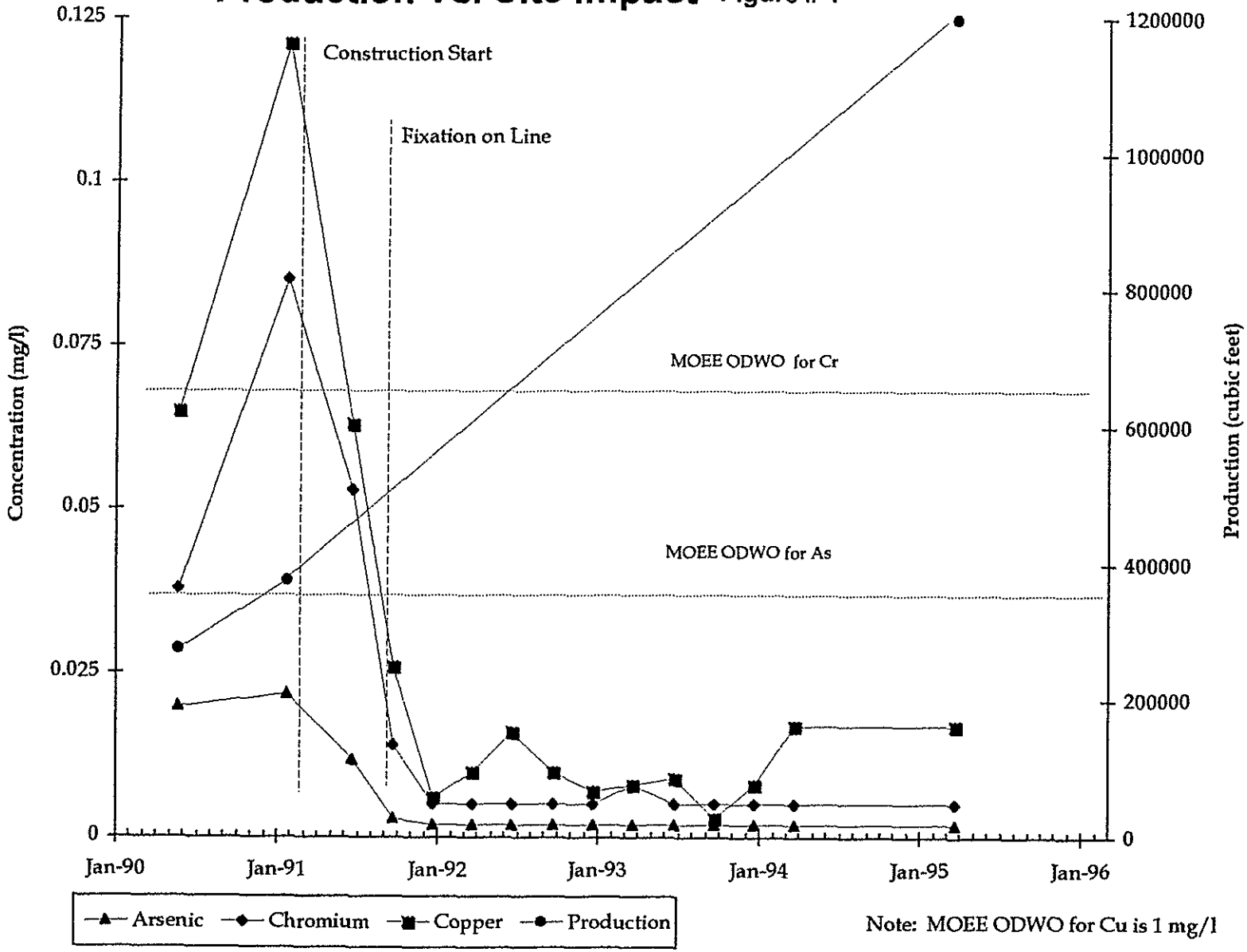
There are many challenges in this industry which must be overcome in order to ensure its future survival. Few of our accomplishments would have been possible had we not been involved in continuous research with Dr. Paul Cooper and the University of Toronto. This is why our company will continue to work on and support research and development in the wood treating industry, and why we hope that other treaters will do the same.

## 5. Summary

In summary, Guelph Utility Pole has been very progressive in the area of new wood preservation technologies and we have been rewarded for our efforts. We have an increased level of confidence in our product from our customers and an excellent working relationship with The Ontario Ministry of Environment and Energy and local officials as well as with neighboring residents. Our company has been honored and some very prestigious awards including the Ontario Waste Management's "Outstanding Waste Reduction Award" for 1993 and many positive newspaper articles. This year we have been selected by the Ontario Ministry of Environment and Energy for there 1995 "Pollution Prevention Pledge Program Achievement Award". Our Company has also received grants and tax credits for our innovative and energy efficient process developments.

Guelph Utility Pole's work in researching accelerated fixation and applying it to our process has provided us with many positive returns. I'm certain that similar returns will also be enjoyed by other wood treaters who invest in research and development and make accelerated fixation a part of their production process.

# Production Vs. Site Impact Figure # 1




Note: MOEE ODWO for Cu is 1 mg/l