EMERGING ENVIRONMENTAL ISSUES

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1. Introduction

There have been numerous recent regulatory activities which have affected or may affect the wood preservation industry. It is important for the industry to be aware of such activities, some of which are outlined in this paper.

2. New Knowledge About Active Ingredients

2.1 Arsenic

In the past year there have been numerous public reports on serious health problems associated with very high levels of arsenic in drinking water in India and Bangladesh. The arsenic concentrations are due to natural geological sources. Nonetheless information on exposure and effects of arsenic on residents of India and Bangladesh, as well as Taiwan and Chile was used to re-evaluate the suitability of current arsenic limits in drinking water in the United States.

On March 23, 1999 the United States National Research Council issued a press release which stated "new information on arsenic exposure and cancer indicate that the EPA's current standard for acceptable levels of arsenic in drinking water does not sufficiently protect public health".[1] The Council estimated that long term exposure of an individual to the U.S. drinking water standard of 50 µg/L, could result in a risk of bladder cancer in the order of one chance in 1,000, and for all cancers a risk of 1 in 200 was estimated. These risks are much greater than the general accepted risk of one in 100,000.

The new information will obviously influence the efforts of the EPA which in accordance to the Safe Drinking Water Act is required to revise the existing drinking water standard for arsenic. By January 1, 2000, EPA is to publish a "proposed arsenic rule" with a "final arsenic rule" to be published to January 1, 2001.[2] There is pressure to adopt the World Health Organization guide line of 10 µg/L.

Currently the Canadian drinking water criterion is 25 µg/L and a Health Canada revision to this criterion will likely be dependent upon the U.S. EPA review.[3]

- What can this mean to the wood preservation industry?
- Standards for remediation of properties with CCA contamination would change in at least two ways.

- Groundwater standards for protection of drinking water would be more stringent.
- Soil standards for protection of human health will likely become more stringent, because "reference doses" would be lowered numerically (the reference dose represents a dose at which health effects may be observed).
- Regulatory concerns about the use of products using arsenic may increase.

2.2 Other Chemicals

In the past year there has been no new information about other wood preservation chemicals which may influence current regulatory limits or restrictions. It should be noted that pentachlorophenol and PAHs have been previously identified as "endocrine disrupting chemicals", i.e. chemicals which can mimic or interfere with mechanisms of naturally occurring hormones responsible for regulating reproductive and developmental bodily processes. Regulatory actions will be dependent upon further studies that are attempting to determine the actual environmental impact of such chemicals.

3. Outside Pressure

The industry is without doubt aware of the steel industry's attempts to gain a larger share of the utility pole market. In October 1998, the American Iron and Steel Institute (AISI) published a response to the North American Wood Coalition regarding a "change proposal for revision of strength and loading factors the NESC for wood and steel pole construction".[4] The statement challenges the ability of the industry to provide assurance of the strength and integrity of any given wood pole due to biological degradation and the use of plantation or second growth trees.

The AISI lists its "top reasons to purchase steel distribution poles" including:

- "Steel poles are the answer to EPA regulations and deforestation issues." "The poles are non-toxic, which reduce disposal problems or costs and they can be reused or recycled."
- "Steel retains its shape and strength and isn't susceptible to damage by woodpeckers, insects, rot or fires." "There is no expensive inspection and toxic treatment programs necessary after installation of steel poles."

Public interest group pressure on the use of wood preservative chemicals continues. Reports such as "Poison Poles - A Report About Their Toxic Trail and Safer Alternatives" by the National Coalition Against the Misuse of Pesticides,[5] and "Will CCA Wood Become the Next Asbestos Crisis?"[6], can provide a slanted picture to the uninformed public. However, health advisories such as provided by the Connecticut State Department of Public Health will make the public more concerned about the use of wood preservative products. The advisory suggestions include: "keep children and pets out of areas underneath play equipment or decks"; "every two years, properly apply to all CCA treated structures a sealant, preferably and oil-based stain", and "do not grow edible plants near CCA treated play equipment of decks".

Proper chemical management, proper treatment, life cycle product management and a good

information base are all required by the wood preservation industry to counter challenges as noted above. The industry has undertaken such efforts, however, more may be required, as described in the next section.

4. Chemical Management

In the year 2000, the Canadian wood preservation industry will be assessed in terms of compliance with technical recommendations prepared for the enhancement of human health and environmental protection. This effort will go a long way in advancing the industry to the level practiced by other members of the forest industry. For example, every major coastal forest company in British Columbia now has external annual audits of its chemical management program. Individual sawmills are carefully assessed with respect to their chemical use practices, including antisapstain chemicals, fuel and lubricants, solvents and paints. Air, liquid and solid releases and disposal are also carefully assessed. As well as enhancing human health and environmental safety, the assessments also address aspects such as directors' liabilities, as well as influencing the cost of insurance policies.

In order to modify the concerns expressed by producers of competing products and the public, the wood preservation industry must assure ongoing chemical and product management. One negative incident by one plant may have an incredible impact on the whole industry.

Recently, one retail company, Home Depot, announced that it would only purchase its supplies from manufacturers who conform to ISO 14000 standards. If this trend continues, then the wood preservation industry will have to initiate steps for ISO regulations. This is another topic in itself, but should bear watching. In a publication by R.W. Stephens Consulting Ltd. (1999)[7] it is noted that compliance with the wood preservation technical recommendations document will not entirely fulfill the needs of ISO 14000.

5. Regulatory Issues

In the past two years since my presentation to the Association there have been numerous regulatory developments relating to environmental issues at wood preservation sites.

5.1 Stormwater Monitoring

In 1997, I described findings that suggested active ingredients such as DDAC and IPBC used by the sawmill industry were not likely the source of frequently observed toxicity of stormwaters. Failure of the toxicity test could possibly result in charges under the Fisheries Act. Zinc from galvanized roofs and wood leachate was suggested as other possible sources of toxicity. Since 1997, there have been more developments in this area:

Detailed studies of causes of storm water toxicity have been completed

Bailey et al (1999)[8] published the results of 58 storm water samples from sawmill sites. The results found that:

- 42 of 58 samples were toxic to juvenile rainbow trout;
- zinc was attributed to be the source of toxicity in 32 of the 42 samples;
- low hardness was associated with most samples where zinc toxicity was apparent;
- toxicity in the 7 of 42 samples was attributed to tannins and lignins, with the causes of 3 unknown;
- water with a hardness of 5 mg/L was toxic (96-hr LC_{50}) with 14 µg/L zinc, and water with a hardness of 100 mg/L was toxic at 272 µg/L zinc.

Additional studies of stormwater toxicity at wood preservation plants were undertaken

Several studies at industrial CCA treatment plants were completed. The findings included:

- zinc and copper were the likely sources of toxicity, based on concentrations and based on toxicity identification evaluation techniques;
- determinations of runoff from 4 galvanized roofs at wood preservation operations indicated 1,540 and 1,680 µg/L of zinc. Recently determinations of zinc runoff from 2 sawmill roofs indicated concentrations of 3,970 and 6,960 µg/L at hardness levels of 2 to 5 mg/L. Compared to the zinc toxicity of 14 µg/L at hardness of 5 mg/L, this indicates that dilutions up to 1400 fold with other yard runoff waters would be required for a non-toxic bioassay;
- an increase in hardness frequently converted the effluent from "toxic" to "non-toxic".

Regulatory agencies have been requested to modify procedures for toxicity testing

On June 23, 1999, The Coast Forest Lumber Association (CFLA) with the support of Envirochem Consultants Ltd. and EVS Environmental Consultants Ltd., presented to Environment Canada and BC Environment, an alternative protocol for toxicity testing in accordance to a request by both regulatory agencies at an earlier meeting. The protocol consisted of:

- assessment of receiving environment water quality conditions, particularly with respect to pH and hardness; and
- conducting the bioassay tests under the pH and hardness conditions of the receiving waters.

Given that the industry has paved a considerable fraction of its storage yards, a toxicity test with rainfall typically with low pH and hardness, will in most cases overestimate the actual toxicity in the receiving water. The revised protocol will enable a "more fair" evaluation of potential impacts of a discharge.

5.2 Zinc

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The prior section described how releases of zinc may result in discharges which do not meet regulatory requirements.

Our studies at sites with galvanized buildings also indicate that zinc releases can cause problems with soil quality. At one site, for instance, soils adjacent to the buildings were influenced by zinc and toxic to earthworms and germination of various vegetation seeds.

Our findings have gained the attention of the zinc industry, and companies such as Cominco are now evaluating means to coat galvanized materials to prevent releases.

There are two points for the wood preservation industry:

1. Roofing materials at wood preservation plants should be evaluated so that zinc is not released. The presence of a building material should not reflect on chemical use practices at any industry.
2. With the use of ACZA, care should be placed in assuring proper fixation of zinc.

5.3 Contaminated Sites

All members of the wood preservation industry are aware of the regulatory and legal concerns about contamination of soils and ground-waters. An application for a construction permit or, a land or corporate sale will trigger questions about the status of a property relative to regulatory standards for soils and ground-waters. Briefly, in the past two years, there have been some regulatory changes in British Columbia with regard to contaminated sites.

Re: Chlorophenols

In 1997 BC Environment published its standards for chlorophenols in soils and ground-waters. The standards were based upon BC Environment ambient water quality criteria. An Envirochem review of the background for the criteria suggested that there were several fundamental errors in data interpretation, which resulted in the publication of possibly over stringent criteria. Envirochem contacted Mr. John Wilkinson of the Pentachlorophenol Task Force, who then initiated a study of known information on the aquatic toxicity of pentachlorophenol. Mr. Wilkinson presented the results of the Task Force review to the Ministry. In December 1997, BC Environment revised its water quality criteria, one of the few times a revision actually made a criterion less stringent. In July 1999, BC Environment modified its standards for soils where groundwater flows to surface water used for aquatic life, in accordance with the following table.

	PCP Standards for Soils (B.C.) Standards	
	1997	**1999**
Soil pH	**mg/kg (ppm)**	
5.0 – <5.5	25	150
5.5 – <6.0	0.5	2.5
6.0 – <6.5	0.05	0.3
6.5 – <7.0	0.02	0.15
7.0 – <7.5	0.05	0.15

Although I feel the 1999 standards are still too stringent (particularly for the pH 6.0 - <7.5 range), the change is extremely beneficial particularly if bioremediation is the choice of reducing chlorophenols in soils.

For groundwater the standards have changed from a range of 0.2 – 3 µg/L to 1 B 27.5 µg/L for pentachlorophenol.

It should be noted that where human health is the only receptor, then the standard has changed from 1000 mg/kg (ppm) in residential soils to 100 mg/kg. For commercial industrial soils, the standard has changed from 3000 mg/kg to 300 mg/kg.

Re: Reporting Requirements

New protocols for testing and/or reporting are frequently released by the industry. Most recent proposed requirements are the monitoring of sediments and pore waters of a water body adjacent to a contaminated site. We responded to the proposal with the following concerns:

- The monitoring program would have to be pre-approved by a consortium of regulatory agencies. Given that it takes three months to obtain approval for simple hand auger sediment sampling in a foreshore area and six months for review of a report, further regulatory response delays would affect any new developments.
- Pore waters would have to meet "ambient water quality criteria". For example, arsenic concentrations cannot exceed 5 µg/L (5 ppb).

Re: Concerns About Liability

In the past several years we have observed the collapse of many sales of properties in B.C. because of buyers concerns about liabilities. There is no "Brownsfield" type of legislation in B.C., and many properties will remain unsold and unproductive. In many cases, the potential environmental and human health impacts are minimal, and could be easily controlled.

6.0 Summary

Overall it is important that the industry is able to maintain an awareness of developments in regulatory policies. The pentachlorophenol issue is an example, that policies can be changed, providing of course that information is rationally and objectively presented. It is my view that policies and standards now have less cogitation of science and cost-benefits than they had 20 years ago. Additionally many standards, particularly in British Columbia, are implemented with minimal public notice. It is necessary for the industry to be on "its toes" more than ever.

References

1. National Research Council News Release, March 23, 1999. "EPA Needs More Stringent Standard for Arsenic in Drinking Water."
2. U.S. Environmental Protection Agency, June 03, 1998. "Arsenic in Drinking Water B Regulatory History."
3. Health Canada Report by Federal-Provincial Subcommittee on Drinking Water.
4. American Iron and Steel Institute, October 9, 1998. "AISI Response to North American Wood Pole Coalition."
5. National Coalition Against the Misuse of Pesticides, 1997. "Poison Poles. A Report About Their Toxic Trail and Safer Alternatives."
6. Origin Biomedical, 1999. "Will CCA wood become the next asbestos crisis?" Web page publication.
7. R.W. Stephens Consulting Ltd., 1999. "Socioeconomic Analyses of Environmental Management and Waste Disposal Options for the Canadian Wood Preservation Industry." Prepared for Environment Canada, Hull, Quebec.
8. Bailey, H.C., J.R. Elphick, A. Potter, E. Chao, D. Konasewich and B. Zak, 1999. "Causes of Toxicity in Stormwater Runoff from Sawmills." Environmental Toxicology and Chemistry, Vol. 18 (7), pp. 1485-1491.