
DUTCH INDUSTRIAL TARGET GROUP APPROACH: A NATIONAL ENFORCEMENT STUDY ON THE VOLUNTARY ENVIRONMENTAL AGREEMENT FOR THE WOOD PRESERVATION INDUSTRY

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SUMMARY

In the Netherlands discussions between government and industry are increasingly leading to agreements about the reduction of the environmental effects of the industrial activities. These agreements are set out in covenants. Some people question the effect of such covenants. Aren't these covenants by definition too voluntary? Isn't it much better to incorporate the agreements in the environmental license, so that they become legally enforceable? This report describes an enforcement study made at wood preservation companies by the Inspectorate for the Environment of the Ministry of Housing, Spatial Planning and the Environment at the end of 1994. These companies impregnate soft woods with chemicals to protect them against fungal attack and rot. This branch of industry was one of the first with which the government reached an environmental covenant. In 1992 the agreements were set out in an action programme with the wood preservation companies. The main objective of this study was to obtain insight into how the municipalities, the competent authority for these companies, and especially the individual companies, have executed the agreements made in connection with the target group policy.

1 INTRODUCTION

1.1 Industry target group policy

The government cannot solve environmental problems on its own, let alone prevent all new problems arising. Development focused on sustainability is only feasible if government, industry and nongovernmental organizations join together in common cause. One major means of achieving the Dutch environmental objectives as detailed in the National Environmental Policy Plans is the Target Group Policy.¹ Agreements are made with each branch of industry, for example the printing industry, the iron and steel industry, the chemicals industry, the wood preservation industry and filling stations, with regard to achieving reductions in emissions by the years 2000 and 2010 as compared with the reference year 1985. The reductions are specified in integral environmental targets which constitute part of the covenant signed between government and the relevant branch of industry. The environmental tasks for the industry are set down in an action program. For the wood preservation industry they are described in the "Action Program for Environmental Measures by Wood Preservation Companies"².

Although the target group policy as such concerns voluntary agreements, it is desirable that the agreements reached for individual companies be set forth in the environmental license, so that the agreements are enforceable.

What is the role of the Inspectorate for the Environment in the industrial target group policy? On behalf of the Minister of Housing, Spatial Planning and the Environment, the Inspectorate for the Environment monitors and makes sure that the industrial target group complies

with the environmental emission reduction targets as specified in the covenant. The Inspectorate does this by carrying out random checks on compliance with the agreements (the execution of these by the companies and the implementation of the measures as required in the environmental licenses).

1.2 Reasons for the project

The wood preservation industry is one of the spearheads in the target group industry. The government has in fact been discussing environmental problems with this branch of industry since the mid 1980's. At the beginning of the 1990's an integrated package of environmental regulations were developed, which are detailed in an action program³. Additional agreements were made in 1993 with the specific group of companies using creosote oil to preserve wood about the restriction of the emission of creosote oil into the atmosphere. The implementation of the environmental measures was to be carried out in phases. All environmental measures specified in the action program were to have been implemented by mid 1994.

1.3 Objectives of the project

Section 1.2 explained that as part of the target group policy agreements have been made to restrict the environmental effects of companies in the wood preservation industry. These agreements are specified in the action program. This article describes how the companies carried out the following agreements cited in the action program:

- Taking measures to protect the soil.
- Decontamination of the soil following earlier pollution.
- Provision of independent inspection of the impregnation installations.
- Restriction of emissions to the atmosphere by using a high boiling-point creosote oil.
- The setting up of a company environmental plan or the development of a company environmental management system.

It was agreed with the authorities issuing the licenses, the municipalities (the Municipal Council), that priority would be given to the incorporation of the environmental measures of the action program in the licenses.

The purpose of the study is:

- To investigate the extent of the implementation of agreements made between the companies and government in accordance with the target group policy.
- To identify bottlenecks, if any, in the agreements made.
- To set up, if necessary, a follow-up program to ensure that any environmental measures not yet implemented will still be complied with.

1.4 Structure and approach to the project

The study was carried out by inspectors of the Inspectorate for the Environment, who inspected the companies with the assistance of a special questionnaire. This questionnaire was discussed beforehand with the parties concerned, including the Association of the Wood Preservation Establishments and the Association of Netherlands Municipalities (VNG). The questionnaire gave particular attention to the following:

- Compliance with the target group agreements (the action program) and relevant existing legislation.
- The situation with regard to the introduction of company environmental management.
- The quality of the current license issued in accordance with the Environmental Management Act in relation to the target group agreements.
- The quality of the supervision by the competent authority, the municipality.

The visit to the company was prepared by examining the dossiers about the company and any other relevant information. The company was informed of the visit in advance. In most cases the company was visited together with the competent authority. The companies were visited in the autumn of 1994. All 36 wood preservation companies operating in the Netherlands that use the impregnation method known as the vacuum pressure method were involved in the study. The study did not extend to other methods of preservation or protection such as dipping or painting the wood.

2 THE CHARACTER OF THE WOOD PRESERVATION INDUSTRY

2.1 Preservation of wood

Unlike hard wood soft wood is susceptible to fungal attack. Wood will be attacked by fungi when it is in contact with soil and water, and in general under moist conditions, and it will rot. Under these conditions wood can be made to last longer if it is preserved. This can be achieved by painting the wood or impregnating it with chemicals which are poisonous to fungi (fungicides).

The most effective method of impregnating the wood is the vacuum pressure process. In this process the wood is placed in an impregnating tank, which is then evacuated to extract moisture and air. Then the impregnating agent is forced into the wood at elevated pressures.

The impregnating agents most commonly used in the vacuum pressure process are creosote oil or metal salts. Creosote oil consists of polycyclic aromatics (including benzopyrene) and phenols. Superwolmansalt is the most-used metal salt, being a mixture of chromium, arsenic and copper salts. Salts based on copper and chromium and on copper salts, either with or without ammonium salts, are also used on a large scale.

When the wood is impregnated with salts then these must be fixed in the wood. In a fixation process the salts are physically and chemically bonded to the wood. The degree of fixation determines the leaching behavior of the metal salts. Fixation can take place naturally during a number of weeks, but it can be improved and accelerated by a treatment with hot air or steam (steam fixation).

Thirty-six companies belong to the branch of industry which impregnates wood with the vacuum pressure method in the Netherlands. The majority of these companies impregnate the wood with salts. Four companies use creosote oil in the impregnation process. The total amount of wood impregnated each year is about 290,000 m³, of which 45,000 m³ is impregnated with creosote oil. There are quite a few smaller companies in the industry; together the fifteen smallest companies produce about 10% of the total amount of impregnated wood. The degree of organization in the industry is limited. About half of the companies are members of the trade-association, the Association of Wood Preservation Establishments in the Netherlands. With a few exceptions the larger companies (annual production >10,000 m³) are all members of the association. The members of this association together produce 77% of the impregnated wood.

2.2 Environmental impact

The nature and the extent of the environmental impact of the wood preservation companies is related to the nature of the impregnating agents used (see paragraph 2.1). Arsenic is a black list¹ substance for the compartments air, water and soil. Chromium is a black list substance for air, and like copper it is also a priority substance.² Emissions of copper, chromium and arsenic salts to the compartments soil and water can occur during the production process and during the storage of impregnated wood (leaching by rainwater).

The impregnation process using creosote oil is carried out at a higher temperature (80 °C). As with metal salts, emissions can occur to soil and water. In this process the emission to the atmosphere (and thus also the smell) is of relevance. In The Netherlands the emission of polycyclic aromatics as a result of wood impregnation was estimated to be 320 tons (80% of the total emission of polycyclic aromatics by industry) in 1985. This is why additional agreements were made with these companies to reduce the emission of the compounds to the atmosphere (90% reduction in 1994 compared with the reference year 1985).

Leaching of the impregnation agents can occur during the useful life of impregnated wood, resulting in diffused distribution in the soil. If waste wood is disposed of by uncontrolled combustion, then heavy metals, especially arsenic, can also be spread in the environment via the air. The ash from this wood also has high concentrations of heavy metals, which can also lead to diffuse distribution of these metals in the environment.

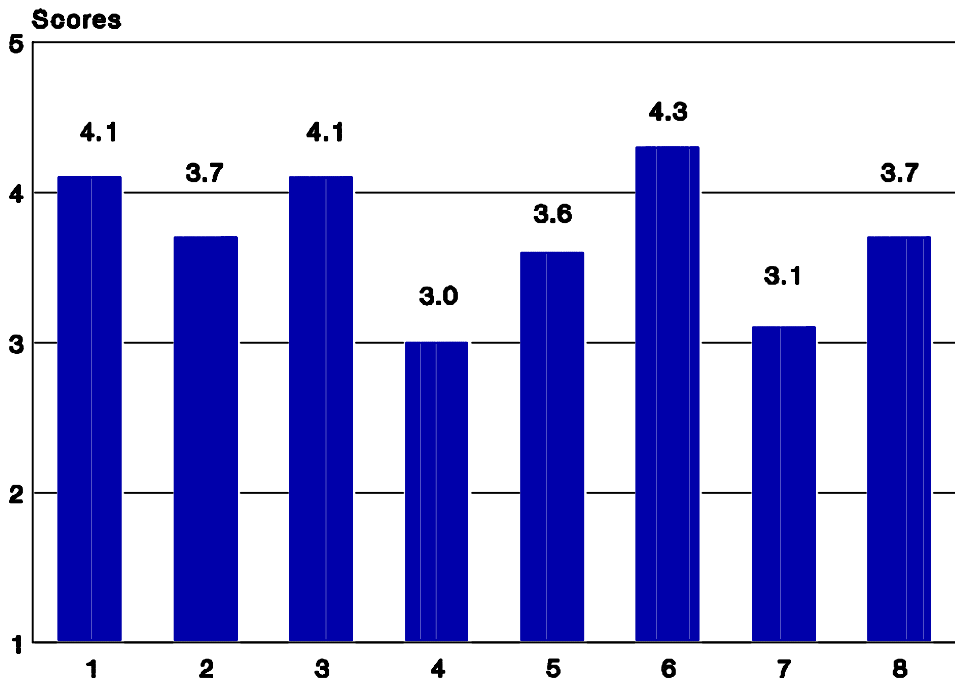
3 RESULTS

When the Inspectorate for the Environment visited the companies an inspection was made of the extent of the execution of the agreements in the action program. In particular an investigation was made of the extent to which the environmental measures in the action program had been implemented also when these measures had not been included, or only partly included, in the current environmental license. This investigation had the aim of gaining an insight of the extent to which the environmental tasks as agreed on with the trade-association were being executed by the individual companies. In addition to this investigation of the implementation of the environmental measures the study also investigated the agreements on the reduction of emissions of polycyclic aromatics by the creosoting companies and the introduction of environmental management systems.

3.1 Execution of the environmental measures from the action program

A selection of the most important measures in the action program was used to draw up a checklist, and this was worked through during the inspection of the company. The questions were clustered in company departments or activities (ten clusters). After the assessment of the results from the individual questions seven clusters were then awarded a final score. Figure 1 shows a summary of the average scores of these clusters, after which the results for the different clusters are discussed in more detail.

Figure 1. Average score for the implementation of the environmental measures in the action programme per cluster of company departments. A score of 1 signifies poor implementation or no implementation at all; 5 signifies excellent implementation



- 1 = impregnation installation and surroundings
- 2 = exit track of impregnation process
- 3 = storage of salt solutions and creosote oil
- 4 = storage of vessels of impregnation agents
- 5 = approval of impregnation installation
- 6 = post-treatment installation
- 7 = storage of impregnated wood
- 8 = average score of the clusters

3.1.1 Impregnation installation and surroundings

The execution of this part of the action program required the presence of provisions in the impregnation area such as liquid catchment, measuring and control equipment and floors impermeable to liquids. Three-quarters of the companies complied with this part of the action program. Two companies met almost none of the requirements.

3.1.2 Exit track of impregnation process

Particular attention was given to the catchment of the liquid released during the removal of the wood and to the presence of floors impermeable to liquids. More than half of the companies that impregnate with salt complied with this part of the action program. Four companies fell far short of the requirements. With three of the four companies impregnating with creosote oil the compliance was poor or unsatisfactory. In particular it was seen that the companies which did not meet the requirements in this part of the process lacked good facilities to catch the impregnation liquids.

3.1.3 Storage of salt solutions and creosote oil

This part deals with the storage of salt solutions in the storage reservoir, the mixing tank and of the storage of creosote oil in above ground steel tanks. The agreements in the action program cover optimum and safe storage conditions to prevent the undesirable release of the impregnation agents to the surroundings. Three-quarters of the companies complied with this part of the action program. Three companies complied with only a few sections of the requirements. A feature that was relatively frequently missing was the high level or overflowing protection on the salt solution storage reservoirs.

3.1.4 Storage of vessels of impregnation agents

The directives of the Committee for the Prevention of Disasters, CPR 15-1 and 15-2³ of the Netherlands apply to the storage of impregnation agents in vessels as received from the supplier. Twenty-one companies have a method of storage of the impregnation agents such that they should comply with these directives. More than half the companies observed these directives to a high level. Nine companies clearly did not comply with the directives. In particular this was because the storage room itself did not comply with the regulations (for example the storage area was not separated from other activities) or because the impregnation agents were not stored separately from other materials.

3.1.5 Approval of impregnation installation

The impregnation of wood is carried out in tanks subjected to both vacuum and pressure. The tanks must therefore be periodically approved by a recognized agency. The agreements on this point in the action program were complied with by two-thirds of the companies.

3.1.6 Post-treatment installation

Eighteen companies impregnating the wood subject it to a post-treatment process with steam or hot air (fixing process). The agreements in the action program covering the post-treatment installation are aimed in primarily at the prevention of leakage. All the companies catch and reuse the liquids released during fixation. Sixteen companies complied with the agreements in the action program. Two companies did not comply with the agreements. One company had a catchment reservoir which is not completely leak-free and the other company transported the wood to the post-treatment installation using a route which is not provided with a

ground surface impermeable to liquids. The other companies use natural fixation instead of a post-treatment process. In most cases this took place in a roofed area. Two smaller companies made do with the use of tarpaulins.

3.1.7 Storage of impregnated wood

In the action program it was agreed that impregnated wood should in principle be stored in an area with a floor impermeable to liquids. The companies using the salt impregnation process can catch the rainwater running off the wood in a buffer tank and reuse it. Alternatively the storage area can be roofed over, so avoiding contamination of the rainwater through leaching of the impregnation agents from the impregnated wood. The study shows that one third of the companies have realized this situation to a far-reaching degree. About half the companies have a storage area of which part of the ground is impermeable to liquids or roofed over. The wood which has recently been impregnated is stored in this area, and then after a few weeks moved to an area where no provisions have been taken to protect the soil. The other half of the companies had a storage area which was completely or partly paved with bricks or an asphalt surface which was cracked.

3.2 Checking the quality of the soil

The environmental measures in the action program provide for the periodic investigation of the quality of the soil in the storage area. When the storage is in an area in which the surface is impermeable to liquids, then the agreement is that the groundwater be sampled once every five years and analyzed for the presence of the impregnation agents used by the company. When the storage is in an area where the surface is not impermeable to liquids, then the soil and the groundwater are to be sampled once a year and the samples analyzed for the presence of the impregnation agents. In both cases the soil should be examined before December 31, 1994. It was found that this investigation has actually been made by only a limited number of companies (four). The results are sometimes difficult to interpret because of earlier soil pollution. They indicate that the influence of leaching on soil contamination is limited. Eight companies had plans to carry out the soil examination in mid 1995. At the time of the study the other 24 companies had as yet no plans.

3.2.1 Leaching tests

One of the possible causes of earlier pollution of the soil is the leaching of impregnation agents from the stored preserved wood. In the action program agreements were made about the leaching standards for wood impregnated with salts or creosote oil and the annual checking of these standards. The study shows that all the companies, except four, have the annual check carried out and meet the specified leaching standards. Nearly 80% of the companies who have this leaching test carried out are in the possession of a certificate with a paragraph on the environment which includes an explicit statement about the leaching standard.

3.2.2 Soil examination and clean-up

In addition to the periodical soil examination the action program also specifies that a preliminary soil analysis for the quality of the soil and the groundwater must be carried out before October 1, 1992. To date 31 of the 36 companies have carried out an examination of the soil. Table 1 shows a summary of the analyses of these samples.

Contamination of soil and groundwater	Number of Companies
All parameters under the intervention level (4)	17
One or more parameters above the intervention level	14

When one or more intervention levels were exceeded at the fourteen companies then this was for the heavy metals (especially arsenic) and polycyclic aromatics. Of the twelve companies where the intervention levels were exceeded one company has nearly completed the clean-up of the soil, two companies have started the clean-up, five companies have plans to clean-up the soil and four companies have as yet no plans.⁴

3.3 Reduction in the emission of polycyclic aromatics by creosoting companies

In addition to the other agreements the companies impregnating with creosote oil had also agreed to use only high boiling point creosote oil (with a distillation range such that at 300°C a maximum of 5% volatile constituents are present) from 1 July 1994. The aim is to reduce the emission of polycyclic aromatics into the atmosphere by 90% as compared with 1985. Three of the four companies complied with this requirement at the time the study was made. At the time one of the four companies was still using a creosote oil which contained 45% volatile constituents at 300°C. Since the study this company has also switched to high boiling point creosote oil.

3.4 Company environmental management

A company environmental management system is an important means of implementing and managing the measures resulting from the target group discussion in individual companies. The initiative to introduce such a system in the wood preservation industry has been allocated to the trade-association.

In the action program it was agreed that the companies would submit a company environmental plan to the competent authority by October 1, 1992, which was to contain an explanation of how and when the environmental measures were to be implemented. In a later stage it was agreed with the Association of Wood Preservation Establishments in the Netherlands that this company environmental plan would form part of the future environmental management system for this sector of industry.

3.4.1 The role of the trade-association

The Association of Wood Preservation Establishments in the Netherlands fulfilled its duty by arranging for the development of a model management system. The system is largely based on BS 7750 (British Standard) and was completed in mid 1993. The system is documented in an environmental management manual. The contents of the manual include a statement of the environmental policy and general information about environmental legislation and regulations of

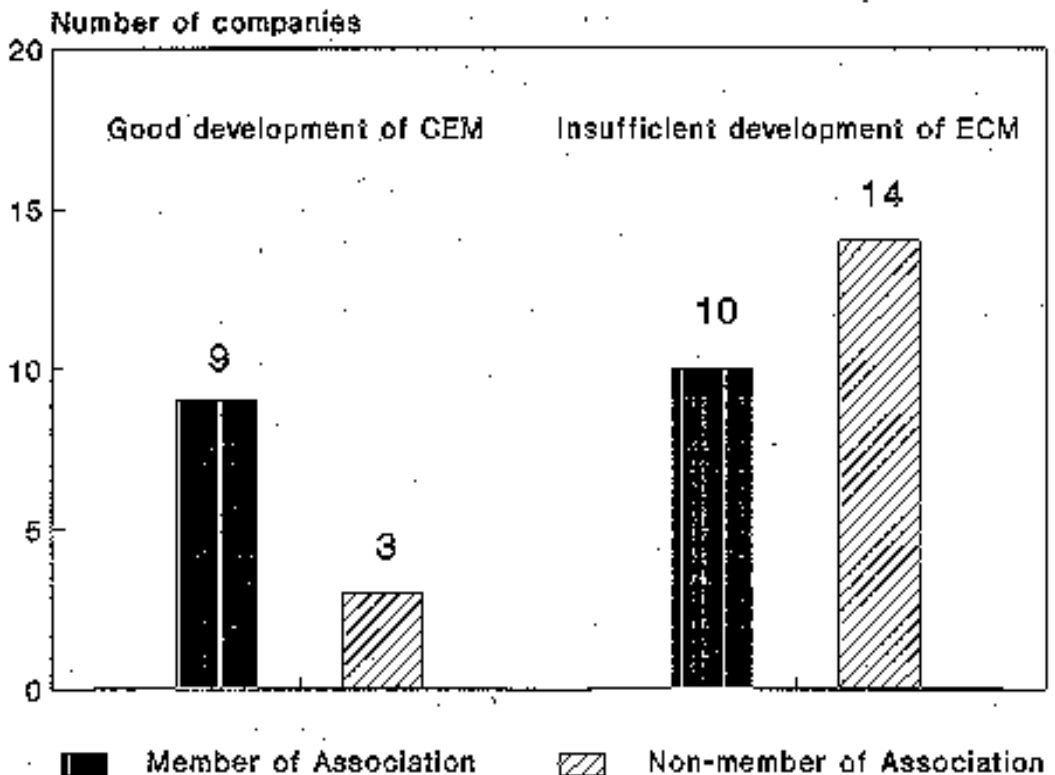
relevance to the industrial branch. The manual also contains a checklist which companies can use to assess to what extent the agreements from the target group policy have been implemented. On the basis of this assessment the companies can draw up a company environmental plan, so that the shortcomings can be rectified. The trade-association promoted the introduction of the environmental management system with newsletters, an instructional video tape, meetings of company environmental coordinators and the organization of a symposium. The non-members of the trade-association also participated in the symposium and they received copies of the instructional video tape.

3.4.2 Introduction by the companies

Members of the Association of Wood Preservation Establishments have copies of the environmental management manual as drawn up by the trade-association. Of the other companies (the approximately 50% non-members), three had an environmental management manual which had been drawn up on their own initiative. Four companies had drawn up a (simple) company environmental plan based on the environmental measures in the action program. The other companies had not yet made any attempt to develop a company environmental management system or even a simple company environmental plan. Except for one company none of these are members of the trade-association. Most are small companies; their combined production of impregnated wood is less than 10% of the total production in the Netherlands and in most cases they have less than five employees.

Figure 2 Development of company environmental management (CEM) systems by the wood preservation companies in the Netherlands

FIGURE 2



The possession of an environmental management manual is a condition for a company environmental management system, but it does not guarantee that it is actually used in practice. This proposition is confirmed by the results of this study (see Figure 2). Only half of the members of the trade-association who had a copy of the association's manual had worked on an environmental management system. Evidence of working on such a system is the possession of a clear program of the environmental measures which are to be taken (planning, responsibilities, safeguards), thorough integration in company management (clearly defined responsibilities) and the existence of, or plans for, an internal environmental report. The formulation of an external environmental report is receiving attention from the companies (five companies have plans for this report), but at the time of this study the reports had not yet been drawn up. The general situation was similar for the three companies which had independently developed a company environmental management system.

The other members of the trade-association have until now given insufficient attention to the introduction of the company environmental management system as provided the association. In a number of cases there was a plausible reason (the company is just starting up, there is a changeover to a new method of process control), but the general picture with this group was not very positive.

Table 2. Summary of the agreements in the action program incorporated in environmental licenses

Measures from Action Program in the License	Number of Companies
All measures	8
The majority of the measures	7
A few of the measures	7
No measures	14

3.5 Incorporation of environmental measures in the license issued by the municipality

An important part of the requirements for environmental protection which must be met by a company are included in the environmental license. For each of the 36 companies in this study an investigation was made of which licenses were required, which have been issued, and in how far the licenses were up to date. The licenses were also assessed on their contents. In this assessment special attention was given to the extent to which agreements in the action program had been incorporated in the license issued by the competent authority (the municipality). All companies possessed a license as required by the Environmental Management Act of the Netherlands. Of these 36 environmental licenses eighteen had been issued before 1990; the average year of issue for all companies was 1987.

The action program for the wood preservation industry came into force in May 1992. It was agreed with the municipalities that the environmental measures from this action program would be incorporated in the licenses with priority. The study included an investigation of the extent to which this agreement had been honored by the end of 1994.

Table 3. Summary of the number of company inspections by municipalities

Number of inspections in the two years preceding the study	Number of companies
None	8
One, two, or three inspections	18
Four inspections	6
Five inspections or more	4

In view of the average year of issue of the license this result is not surprising. The reasons for the backlog were stated to be uncertainty over the future plans of the company and having other priorities. In a number of cases it was found that the municipality was not sufficiently aware of the existence of the action program. Most companies, certainly the larger ones, are thoroughly familiar with the environmental measures in the action program. The average quality of the licenses was assessed as not very satisfactory (score 2.9 on a 5-point scale). The most important inadequacies of the licenses concerned protection of the soil.

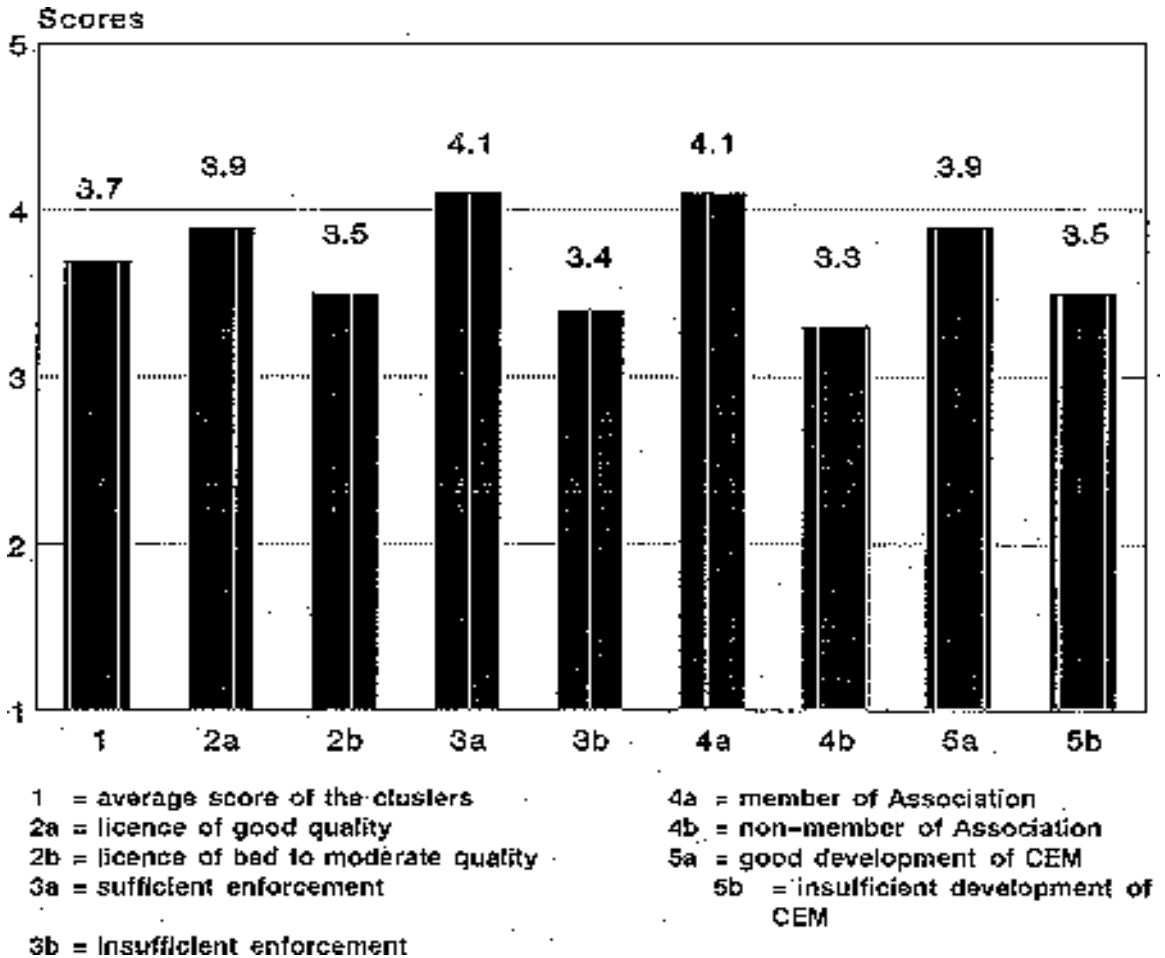
The quality of the licenses of companies which are members of the Association of Wood Preservation Establishments in the Netherlands is in general better than that for non-members (average score 3.2 compared with 2.6). This does not mean that all members had a satisfactory license. In five cases the license was judged to be unsatisfactory. Conversely, three companies which are non-members had a satisfactory license.

3.6 Enforcement

During the study an investigation was made of the way in which municipalities supervise compliance with the environmental license. As part of their enforcement task the municipality should regularly visit each company to which it has issued a license. During this visit the municipality should preferably give attention to all relevant environmental matters. Part of the procedure is the reporting of the findings, and informing the company of these. If necessary the municipality can resort to administrative powers, criminal proceedings and sanctions. The number of inspections made by the municipality in the two years prior to the study were investigated. The standard for this kind of company has been specified as two inspections each year.

Eight companies had not been subjected to any inspection by the municipality in the previous two years. The final assessment of the quality of the enforcement was based on the frequency of the inspections and a number of qualitative aspects (degree of supervision, written reports and follow up). The average assessment of the quality of enforcement - which of course was influenced negatively by the simple fact that about one quarter of the companies had not been inspected at all — is not very satisfactory (score 2.9 on a 5-point scale).

Figure 3. Relationship between the implementation of the environmental measures in the action programme with other factors. Score: 1= poor implementation, 5= excellent implementation



4 DISCUSSION

4.1 Relationship between the implementation of the action program and other factors

The previous chapter described the way in which companies have fulfilled the agreements made as part of the target group policy. Figure 1 (section 3.1) showed that most parts of the action program are being executed in a manner which can be described as good to reasonable.

This paragraph will investigate whether there is a relationship between the execution of the action program and the following factors:

- Incorporation of the action program in the environmental license.
- Quality of the enforcement.
- Membership of the Association of Wood Preservation Establishments in The Netherlands.
- Development of company environmental management.

The results of this analysis are summarized in Figure 3. In each case the average score for the implementation of the environmental measures in the action program is shown for two contrary situations (for example good against poor).

- The incorporation of the action program in the environmental license (2a/2b in Figure 3).

On average it can be seen that for five of the seven sections of the action program investigated the execution of the measures in the action program is better when these measures are incorporated as regulations in the license.

- The quality of the enforcement (3a/3b in Figure 3).

It can be seen that when the quality of enforcement is good (score 4 or more, see section 3.5) the execution of the action program is on average better than for companies where the quality of enforcement by the municipality is found to be poor (score 2 or less).

- The membership of the Association of Wood Preservation Establishments in The Netherlands (4a/4b in Figure 3).

It can be seen that members of the trade-association have on average carried out a better implementation of all parts of the action program than the companies that are not members. But there are also members who have implemented the program to a lesser extent, just as there are nonmembers who have carried out a better implementation of the program. The members of the trade-association produce 77% of the yearly amount of impregnated wood. All of the larger companies, with one exception, are members of the trade-association. These companies have correctly executed most of the environmental measures in the action program. The agreements about the storage area for impregnated wood have been at best partly implemented by all companies, including the larger companies.

- The development of company environmental management system (5a/5b in Figure 3).

An impression of the influence of an environmental management system which is working as it should on the behavior of companies in their compliance with environmental regulations was obtained by comparing the scores for compliance with the environmental measures in the action program (see section 3.1) with each other. The group which had been judged to have a reasonable to good management system scored on average 3.9, whilst the group which has no effective management

system had a lower score of 3.5. However this latter group does contain companies which have achieved a (very) high level of implementation of the environmental measures.

4.2 Licensing and enforcement in relationship to company environmental management system

A good company environmental management system gives an insight into the emissions caused by the company and the risks, the measures which have been taken or are to be taken to minimize them and the effectiveness of the measures. These factors are also of importance for the issue of the environmental license and its enforcement. It is reasonable to suppose that the competent authority takes the existence of a company environmental management system into consideration when issuing the environmental license, reporting incidents and with enforcement activities. This section investigates whether this is the case.

When companies had a good environmental management system at the time the license was issued (which was the case with three companies) then the municipality used this company environmental management system to issue the license by incorporating parts of it in the license or by referring to it in the license.

There are more contacts with companies during supervision (enforcement) than when issuing licenses. The study shows that with enforcement activities a good environmental management system played an important role in only half of the cases. The reason given for the limited attention was that the management system is not (yet) part of the license, and therefore is not of significance with regard to enforcement. This is, strictly speaking, a legitimate argument. Nonetheless it would be advisable not to wait until the system is part of the license, but to make a start with giving attention to the company environmental management system during inspections. The role of company environmental management systems will obviously become more important in the future; and companies experience the active use of a company environmental management system as an environmental effort. Conversely the situation must be avoided where companies think of a good environmental management system as a reason to consider 'normal' enforcement activities to be superfluous.

5 CONCLUSIONS

The following conclusions can be drawn from the study made by the Inspectorate for Environment into the compliance with the 'Action program for Environmental Measures for Wood Preservation Companies'. These conclusions concern the companies, the trade-associations as well as the municipalities.

5.1 Implementation of environmental measures by the companies

All the large companies have implemented the majority of the environmental measures in the action program. This is also the case for most of the smaller companies. The environmental measures covering the impregnation process as such (impregnation and fixing) have been correctly implemented by most of the companies. The observance of directive CPR 15-1 by the companies impregnating with metal salts leaves much to be desired. The implementation of the agreements about the exit track from the impregnation tank by the companies impregnating with creosote oil was only moderate to unsatisfactory.

The environmental measures in the action program covering the storage space for the impregnated wood have been implemented to only a limited extent. Two-thirds of the companies, including larger companies, store impregnated wood in the open and on a surface which is not impermeable to liquids. At the time of the study periodic soil examination in the storage area had not been implemented by the companies, including the larger ones. The companies consider the environmental measures concerning the storage of impregnated wood to be too strict. A number of companies have also indicated that as the result of the use of better impregnation and fixing techniques, the amount of leaching during storage has been reduced to such a degree that the risk of soil pollution during storage is negligible.

In general members of the trade-association have implemented the action program better than non-members.

5.2 Reduction in the emission of polycyclic aromatics by the creosoting companies

All four creosoting companies active in the Netherlands use high boiling point creosote oil. This is as such a proper implementation of the agreements made to reduce the emission of polycyclic aromatics by the creosoting companies.

5.3 Introduction of company environmental management

The trade-association has correctly carried out its role in the introduction of environmental management systems by individual companies. The introduction of an environmental management system has been carried out correctly by one third of the companies. In general these companies have implemented the environmental measures in the action program better than the others. Eight of these companies are members of the trade-association. One third of the companies have done nothing towards a company environmental management system. These are smaller companies, in most cases fewer than five employees.

5.4 Incorporation of the measures in the environmental license by the municipalities

All companies have licenses as required by the Environmental Management Act. A quarter of the licenses were issued after the action program came into force (1992). In two-thirds of the licenses the environmental measures in the action program are not incorporated or only marginally incorporated. In qualitative terms these licenses are unsatisfactory. Individual municipalities have given insufficient attention to the agreement which was made to give priority to incorporate environmental measures from the action program in the licenses. The main reason given was that the municipalities have other priorities. In some cases the municipality did not know of the action program.

When the environmental license includes the environmental measures from the action program then the implementation is better.

5.5 Enforcement of the environmental license

The supervision by the municipalities of the compliance with the regulations of the license is not yet in all cases at the required level. Three-quarters of the companies have had one or more integral inspections with regard to compliance in the last two years. One quarter of the companies have had no inspections at all. Just one-third of the companies have undergone inspections at the required frequency.

Correct enforcement has a positive influence on the implementation of the action program.

The general conclusion is that most of the companies have implemented the environmental measures in the action program in a way which can be considered as good to satisfactory. The municipalities have lagged in the incorporation of the environmental measures in the license. It would appear that environmental management has become part of company thinking to an extent such that agreements that have been made are being honored - and are being honored even when they are not incorporated or only partly incorporated, in the environmental license. Considered in the light of the target group policy this is a positive development. It shows that for environmental protection the covenant has had a greater value than the traditional instrument of the license. The passive attitude in general shown by the municipalities in incorporating the environmental measures from the action program in the environmental license has had a negative effect on enforcement - after all agreements are not of a nature such that they can be enforced. It should be realized that the wood preservation industry is a small and very homogeneous branch of industry, with a high degree of organization, where the trade-association plays a very active part in the area of the environment. This, together with the fact that the action program consists of a set of concrete measures, creates optimum conditions for the implementation of the target group policy.

6 Recommendations

The recommendations which can be made based on this study by the Inspectorate for the Environment are grouped together for the various participants concerned.

6.1 Municipalities

- Those licenses issued in accordance with the Environmental Management Act in which the environmental measures in the action program have not yet been incorporated to a sufficient extent should be updated. When this is being done priority should be given to the companies which have not yet implemented the environmental measures to a sufficient extent.
- When issuing licenses the company environmental management system should be used where this is available. Company environmental management systems should receive attention during inspections.
- The frequency of inspections should be increased to the required level. Those companies which have not yet implemented the environmental measures from the action program should receive a high priority.

6.2 Trade association

- The stimulation and monitoring of the introduction of the company environmental management system developed for the industry should be continued. Extra attention should be given to the smaller companies and solutions more suitable to their needs should be made available to them.
- Active attempts should be made to increase the degree of organization within the wood preservation industry. During these attempts the smaller companies active in the industry should not be forgotten.

6.3 Wood preservation companies

- The environmental measures in the action program which have not yet been implemented should be carried out. In particular attention should be given to the agreements made about the periodical examination of the ground where impregnated wood is stored.
- More efforts should be made to introduce a company environmental management system, where the model developed by the trade-association should be used.

ENDNOTES

1. Substances on the black list are so designated because of their detrimental influence on the environment. In the Netherlands the government is making efforts which include the elimination of pollution by substances on the black list.
2. Priority substances are so designated because the risk (the combination of exposure and properties) they cause is greater than the negligible risk. In the environmental policy these substances receive special attention.
3. Directives from the CPR (Committee for the Prevention of Disasters) for the storage of dangerous substances; CPR 15-1 is applicable for amounts up to 10 tons, CPR 15-2 for amounts above 10 tons.
4. When the intervention level is exceeded then the pollution of the soil is deemed to be serious, and clean-up measures are required.

REFERENCES

1. National Environmental Policy Plan, May 1989; National Environmental Policy Plan Plus, June 1990; National Environmental Policy Plan 2, December 1993.
2. Circulaire Werkprogramma milieumaatregelen bij houtimpregneerbedrijven ('Action program for environmental measures for wood preservation companies'), May 1992 (available only in Dutch).