Tauw

Environmental Due Diligence Assessment, Phase I, Icopal, Høland, Norway

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Responsibility

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Nordisk Wavin A/S

The Icopal Facility in Høland, Norway

Environmental Due Diligence (Phase 1)

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1 Executive Summary

Introduction

Tauw bv was retained by Nordisk Wavin A/S to conduct a Phase I Environmental & Compliance Assessment of the Icopal facility in Høland, N-1960 Skårer, Norway. This executive summary presents the key findings and environmental liabilities associated with the property. The work was performed in accordance with Tauw's proposal, which was authorised by Wavin on 8 January 2001. Tauw cooperated with COWI A/S, one of the partners within the CAT Alliance.

Site profile

The subject site is situated at Skårer, a town located in the municipality of Aurskog-Høland. The site is located approximately 40 km to the east of Oslo. The physical planning of the area states that the site is used for industrial purposes. The current land use of the surroundings is to the north, the east and the west of the site agricultural land. To the south of the site a small residential area is located less than 50 metres from of the site.

The site covers approximately 65,200 m² with buildings covering approximately 6,440 m². The site comprises 7 buildings. The facility manufactures PE and PP storm water- and drainage pipes and PVC pressure- and wastewater pipes. Plastic pellets and master batches containing colours and auxiliary chemicals is heated, extruded, calibrated to the wanted dimensions and cooled with air and water. The number of employees in the production is 29, of which 15 are currently working in three shifts Monday to Friday. 10 persons are employed in the administration.

Historical use of the site

Before 1945 it is assumed that the site was a greenfield. From approximately 1945 to 1964, the site was used as a sawmill where wood was cut up. Subsequently a carpenter shop ("Norli Bruk") which manufactured doors and windows was located on site. No impregnation of wood has been conducted on site according to site management and information by old employees, who lived in the area at the time. In 1952 the sawmill burnt and some of the buildings were destroyed. Icopal acquired the site in 1964. Building no. 1 originates from the time of the sawmill, while the other 6 buildings were constructed between 1970 and 1996.

Geology and hydrogeology

The region is covered by at least 10-15 metres of thick clay. No groundwater resources are located near the site. The drinking water supply in the area is provided from the lake "Store Langsjø" located approximately 5 km to the northeast of the site. The nearest watercourse is a small stream located to the south-

west of the site. The stream is located at a distance of approximately 25-50 metres from the border of the site at a level approximately 15-20 metres lower than the site.

Site sensitivity

The environmental sensitivity of the site is considered to be low with respect to groundwater and moderate with respect to surface water.

Environmental status

The Consultant has chosen an appropriate level of effort consistent with the American Society of Testing Materials (ASTM) standards E 1527 and E 1528 for evaluating the environmental status of the property as applicable in Denmark. Based on the scope of the activities conducted to date, it is the Consultant's opinion that there are a number of recognised environmental conditions at the site.

The following environmental issues were identified from the assessment:

The following potential sources of soil and groundwater contamination have been identified from the assessment:

- A 3 m^3 AST for diesel oil used for fuelling the fork-lifts is located in the outdoor storage area.
- A diesel oil tank, with a volume of 1 m^3, which was used from 1995 to approximately 1998, is still present in the area next to the above-described AST.
- Before 1995, the 1 m^3 diesel tank (or maybe drums/cans) was located to the north of the old storage building. This storage was moved in connection with the construction of the new storage building in 1995.
- A 10 m^3 UST for fuel oil was dug up in 1995. The UST had been located in the ground since approximately 1952 and had been used by Icopal from 1964 to 1988. A new production building has been constructed on top of the old tank pit.
- An oil separator located to the south of the production building.
- A washing place, where the fork-lifts are cleaned, is located to the east of the production building.
- Two waste fillings located on the property can contain contaminated soil or other contaminated materials.

Major non-compliances or matters of bad household, which in the future can result in noticeable liabilities:

- The two fillings located on the western part of the site have been approved by the municipality of Aurskog-Høland (by telephone only) but not by the County of Oslo and Akershus, which is the authority to approve landfills.

It can not be excluded that the county will demand the fillings to be moved to an authorised landfill.

- The Norwegian EPA (Statens Forurensningstilsyn) has been contacted in order to verify, whether the production facility needs an environmental permit (utslippstillatelse). SFT states that facilities, which process plastic compounds need a discharge permit if they process PVC *and* are located near a residential area. The facility in Høland fulfils both these criteria, and for this reason the facility should have an environmental permit. An application must be sent to the Norwegian EPA in order to obtain the permit. This means that monitoring can be demanded e.g. on the air emission.

- The residents have complained about noise, vibration and the safety in connection to the heavy traffic through the village. A new access road to the facility is planned and communication between the municipality and the company is on-going concerning financing the road. The municipality states that the road will probably not be constructed unless Icopal agrees to take part in the financing.

- Measurements of the content of lead in the internal air in the production room and mixing room, have shown that some of the workers are exposed to lead concentrations, which exceeds the limit values given in the Ordinance for indoor air quality. According to the site management these lead concentrations were caused by extraordinary conditions, which has now been changed.

Recommendations

Below some actions are recommended. Some of the actions can act as pollution prevention during the future activities on site. The purpose of the soil and groundwater investigation outlined below is to determine the state of contamination at the time of the acquisition. It can not be excluded that some of the contamination on site in the future can affect the present activities on site. The investigation is therefore proposed to be performed in order to know the fully extent of contamination on site.

- Given the nature of the environmental issues identified above, it is the Consultant's opinion that a Phase II soil- and groundwater investigation is highly recommendable. An intrusive investigation should be launched comprising performance of 10-15 boreholes located at the potential sources of contamination.

- The county of Oslo and Akershus should be contacted in order to solve the non-compliance issues regarding the fillings. A written explanation for the county should be elaborated describing the fillings (age, size, type etc.). The County of Oslo and Akershus is the authority to approve the landfills. Tentative cost estimate EUR 7,500-15,000.

- An application should be sent to the Norwegian EPA in order to obtain the required environmental permit. Tentative cost estimate EUR 10,000-15,000.

- Regarding the content of lead in the air in the mixing room and the production room verification is recommended.

- As a matter of "best practice" the working environment should be given attention with regard to the listed problems with the internal (and external) noise level. Tentative cost estimate EUR 50,000-80,000.

- As mentioned above, a new access road to the facility is planned and communication between the municipality and the company is on-going concerning financing the road. The municipality states that the road will probably not be constructed unless Icopal agrees to take part in the financing. The total costs for the likely solution were estimated at EUR 250,000 (2 mill NOK).

Phase II Assessment

The Phase II soil and groundwater investigation, as recommended above, was carried out after the phase I assessment and reported separately (Tauw report R008-3911373KEB-D01).

In this investigation content of total hydrocarbons, toluene and chloroform was found in the south-western filling, indicating that the filling contains contaminated soil.

Also a content of total hydrocarbons was detected in soil next to the 3 m^3 AST, indicating that spill occurs when refuelling the fork-lifts and/or filling the AST.

Furthermore elevated concentrations of chrome and arsenic were detected in several of the borings and also in the original geological materials. It therefore seems that the elevated content of chrome and arsenic is due to a natural high content in the soil in the area. In one soil sample of the backfill at the site a content of zinc above the criteria of sensitive land use issued by the Norwegian EPA was found.

A water sample taken at the base of the north-western filling showed contents of xylenes and methylethylketone. The content of xylenes and methylethylketone indicates that the north-western filling contains contaminated soil. In the same water sample a content of nickel higher than the Dutch Target Value was detected.

As mentioned above, the two fillings are verbally approved by the municipality, but not by the County, who according to the legislation, is the responsible authority to issue a permit.

It is recommended to stop any further filling at the site. We recommend elaborating a historical investigation of the type of soil and other materials deposited in the fillings. It is likely that the county will demand further intrusive investigations of the fillings performed. The cost of a historical review and a detailed investigation including the performance of 10-15 boreholes on each filling is approximately 30,000 EUR. If further investigations shall be performed, it is recommended to carry them out during the spring/summer, when the snow has melted.

Although we assess it as less likely, it can not be excluded that the County will demand the fillings to be moved to an authorised landfill. Especially as this investigation shows that contaminated soil has been deposited in the filling. We estimated that approximately 60,000 m^3 are deposited in the two fillings. The removal, transportation, disposal of soil and refilling with clean materials of the 60,000 m^3 may cost in the order of 5 – 10 mio. EUR based on current Norwegian prices. This estimate should be considered as a worst case estimate. A more pragmatic and cost efficient approach may consist of isolation and monitoring measures.

The amount of contaminated soil found by the 3 m^3 AST is not known, but assuming a total volume of 50 m^3 the cost of removal, transportation, disposal of oil contaminated soil and refilling with clean materials will be in the order of 15,000 EUR.

2 Introduction

Tauw bv was retained by Nordisk Wavin A/S to conduct a Phase I Environmental & Compliance Assessment of the Icopal facility located in Høland, N-1960 Løken, Norway Tauw cooperated with COWI A.S., one of the partners within the CAT Alliance.

The facility in Høland manufactures PE and PP storm water- and drainage pipes and PVC pressure- and wastewater pipes using PE, PP and PVC pellets and masterbatches as raw products.

This report presents the key findings and potential environmental liabilities identified during the assessment, which was performed at the above address on the 16th of January, 2001 by Birgitte Juhl from COWI.

The assessment was conducted in general conformance with the methods and procedures described in the American Society for Testing and Materials (ASTM) Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process (Standard Designations E 1527-97 published May 1997) as can be practically applied in Norway.

The work was performed in accordance with Tauw's proposal, which was authorised by Wavin on 8 January 2001. The objectives, scope, limitations and results are presented in the following sections.

2.1 Objectives

A review of past and present operations at the site and surroundings was undertaken with the primary objective of assessing key environmental liabilities associated with recent acquisition of the sites. Specific objectives were as follows:

- To evaluate current and past manufacturing and related practices at the facility with respect to their potential to impact the environment;
- to evaluate compliance with present environmental legislation;
- characterise the environmental setting of the site, to identify potential migration pathways and vulnerable receptors for contamination originating at the site;

- to identify potential sources of soil and surface/groundwater contamination at the site ("Recognised Environmental Conditions");
- provide an initial assessment of potential financial liabilities associated with environmental issues identified.

2.2 Scope of Work

To meet the objectives, the following scope of work was performed:

Task 1: A site inspection of the facility including a site walk-over, interviews with an available member of the management team and completion of a questionnaire;

Task 2: Interviews with the relevant authorities (municipal, county and the Norwegian EPA), an assessment of available historical, geological, hydrogeological and topographical maps for the area and materials collected during the site visit; and

Task 3: Preparation of a report, outlining the findings and recommendations, including requirements for any further work.

2.3 Limitations and Exceptions

The Consultant has chosen an appropriate level of effort for evaluating the status of the sites. The activities performed constitute all activities appropriate and necessary under the circumstances to evaluate the environmental status of the site. Based on observations of the site and a review of available historical records of site usage, it is the Consultant's opinion that the potential environmental liabilities associated with the sites are those discussed in this report. However, it is impossible to dismiss absolutely the possibility that parts of the site, or adjacent properties, may be chemically contaminated. There is always a possibility that illegal disposal of hazardous substances may have occurred at any site.

The Consultant has prepared this report solely for the benefit of Wavin in accordance with generally accepted consulting practices and for the intended purposes. This report may not be relied upon by any other party without the explicit written agreement of ther Consultant. No other warranty, expressed or implied, is made as to the professional advice included in this report. Unless otherwise stated in this report, the assessment made assumes that the site will continue to be used for their current purpose without significant change. The conclusions and recommendations contained in this report are based upon information provided by others and the assumption that all relevant information has been provided by those bodies from whom it has been requested. Where assessments of works or costs required to reduce or mitigate any environmental liability identified in this report are made, such assessments are based upon the information available at the time and are subject to further investigations or information which may become available. Costs may therefore vary outside the

ranges quoted. No allowance has been made for changes in price or exchange rates, or changes in conditions, which may result in price fluctuations in the future. Where assessments of works or costs necessary to achieve compliance have been made, these are based upon measures which, in the Consultant's experience, could be negotiated with the relevant authorities under present legislation and enforcement assuming a pro-active approach by site management.

3 Site Profile

Information concerning the Icopal facility in Høland and its operations was obtained from a site inspection conducted by Birgitte Juhl of COWI on the 16th of January 2001. An interview was conducted with Mr. Inge Engh, production manager and day-to-day head of the facility. Furthermore the technical director of the Icopal Pipe division, Mr. Michael Malling was interviewed prior to the visit, and he was present during the site visit. All information in this report has been procured from these two persons unless other is stated. Photos were taken during the inspection. Some of the photos are enclosed as Annex 1.

Information was also gained from telephone interviews with the Municipal Authorities in Aurskog-Høland, the County of Oslo and Akershus and the Norwegian EPA, who answered relevant questions about the environmental performance of the facility.

3.1 Location and Description of Properties

The site is located in an industrial area just outside Høland a small village located 40 km east of Oslo. The location of the site is shown in Figure 1. The site has four different land register numbers, 34/158, 34/24, 34/179 and 53/25. The physical planning of the area states that the site is used for industrial purposes. The current land use of the surroundings is to the north, the east and the west of the site agricultural land. To the south of the site a small residential area is located less than 50 metres from of the site.

The site covers approximately 65,200 m² with buildings covering approximately 6,440 m². The site comprises 7 buildings as shown in figure 2. All the buildings are one storey high unless other is stated:

- Building 1: Production room from 1950. A mechanical workshop, a compressor room and a grinding room are located in the eastern part of the production room. Furthermore a small part of the building has a 1st floor with offices (1500 m², Siporex walls with asphalt roofing, the office section has brick walls and Eternite™ roofing).

- Building 2: Production room from 1995 (2000 m², steel element walls with isopor, asphalt roofing).

- Building 3: Storage building from 1970-75 (1000 m², steel element walls with isopor, metal sheet roofing).

- Building 4: Storage building from 1996/97 (700 m², steel element walls with isopor, metal sheet roofing).
- Building 5: Expedition office in two storeys from 1996/97 (2*150m², steel element walls with isopor, metal sheet roofing).
- Building 6: Shed with open front from 1970-75 (1000 m², fast-lock plastic walls with steel roofing).
- Building 7: Tent where fork-lifts are parked (100 m², steel framework with plastic canvas).

The heating of the buildings is at present based on electricity.

External areas:

The site is accessed from the road "Elverhøyveien" by one entrance.

The area was covered with snow and ice at the time of the inspection. According to the site management the areas are paved as follows:

- The outdoor area to the north of the buildings used for storage of finished products is covered by asphalt except a small part located to the west, which is unsealed gravel
- The area between the buildings is covered with asphalt apart from the area to the west of the buildings, which is unsealed gravel.

The facility manufactures PE and PP storm water- and drainage pipes and PVC pressure- and wastewater pipes. Plastic pellets and masterbatches containing colours and auxiliary chemicals is heated, extruded, calibrated to the wanted dimensions and cooled with air and water.

The number of employees in the production is 29, of which 15 are currently working in three shifts Monday to Friday. 10 persons are employed in the administration.

3.2 Historical and Current Use of the Properties

Based on the information obtained during the visit the following details can be stated about the history of the site:

Historical use of the property

Before 1945 it is assumed that the site was a greenfield. From approximately 1945 to 1964, the site was used as a saw mill where wood was cut up. Subsequently a carpenter shop ("Norli Bruk") which manufactured doors and windows was located on site. No impregnation of wood has been conducted on site according to site management and information by old employees, who lived in the area at the time. In 1952 the saw mill burnt and some of the buildings were destroyed. Building no. 1 originates from the time of the saw mill.

The saw mill and the carpenter shop used fuel oil, which was stored in a 6-10 m^3 underground storage tank (UST). This was located where the production building is located today (in the north-western corner). The tank was removed when the new production building was constructed in 1995. According to the site management and the employee responsible for the removal, no sign of contamination was noticed around the tank.

Current use

In 1964 Icopal acquired the site. A storage building and the shed were constructed around 1970-75, the main production building (no. 2) was constructed in 1995 and the new storage building (no. 4) was constructed in 1996/97. The tent where the fork-lifts are parked was constructed in 2000.

In 1995/96 the area denoted as 53/25, located to the north of the production area, was acquired. The area was formerly used as agricultural land. It was levelled and today it is used for storage of finished products.

In connection to the construction of the new production building (no. 2) in 1995 and the storage building (no. 4) in 1996/97, top-soil was excavated from the construction sites. This surplus soil was filled in at the western slope of the site, the area with the land register no. 34/179. This area was also filled with construction materials from the former saw mill, surplus soil from the levelling of the outdoor storage area to the north, crushed PE, PP and PVC waste pipes and surplus soil from municipal building projects outside the subject site. The filling was commenced in 1995 and terminated in 1997/98. The filling is approximately 100 metres of length, 50 metres of width and has a depth of maximum 10-15 metres (according to information from the site management). As the filling is located on a slope the average depth is estimated to be 10 metres. On this background, the total volume of filled in materials is estimated to be 50,000 m^3.

In the northwestern corner of the site, the ground has been levelled in 2000 using soil from various municipal construction projects. This filling has according to the site management a width of approximately 60 metres and a length of approximately 50 metres. The depth of this filling is estimated to be 2-3 metres based on the intrusive investigation performed in January 2001. The corresponding volume of landfilled material is estimated to be 6-9,000 m^3.

According to the site management, the fillings have been authorised (on telephone) by the municipality of Aurskog-Høland. However the municipality does not have provision to approve the establishment of fillings. The counties must approve fillings and written permits must be issued stating the requirements and the standards for the fillings. The county in question is the County of Oslo and Akershus, which has been contacted in order to enquire how they regard the specific case. The county needs a written explanation about the filling from the site management including the types of soil and construction materials, which have been landfilled and the size, age and location of the landfill. Based on this information, the county will determine how to proceed. It can not be excluded that the Authorities will order the fillings to be moved to an authorised landfill.

Main operations

In the following, the main operations carried out at the site are described. Icopal has manufactured PE and PP storm water- and drainage pipes since the site was acquired in 1964. As raw materials PE and PP plastic pellets are used together with masterbatches containing colours as auxiliary chemicals. In 1970 the production was extended to include production of PVC gutters. This production was subsequently ceased. In 1992 production of PVC pressure and wastewater pipes was commenced. Masterbatches containing lead stabilisators are used for the production of the PVC pipes. In table 1 the types and amounts of products manufactured at the site in 2000 are given.

For a short period fibre glass boats made from polyester were manufactured on site. No further information could be procured about this production.

Table 1 Types and amounts of products manufactured at the site, 2000.

Product	Amount in tonnes, 2000
PE-pipes	2210
PP-pipes	890
PVC-pipes	2565

Only a few types of chemicals are used and stored at the facility. The PE, PP and PVC plastic raw materials are in the form of pellets, which are stored in silos on the eastern side of building no. 2. There are 4 silos with a volume of 100 m^3 and 8 built-in silos with a volume of 50 m^3. Furthermore the masterbatch used for colouring the pipes, called carbon-black, is stored in bags in the shed. The masterbatch is based on LDPE and is purchased as pellets. Lead stabilisers are used for the production of PVC. The active compounds in the products are lead-sulfate and lead-stearate and the stabilisers are also purchased as pellets on PE basis. The lead containing compounds are stored in cardboard boxes containing 1 kg plastic bags, which are located on an inserted deck on 1st floor next to the silos and the mixing room. The bags are transported to the mixing room without any employees get into contact with the lead compounds.

The plastic pellets, master batches and the stabilisers are mixed in the mixing room located in the eastern part of the building. Approximately 1-2 % master batch is used in the mixture. The mixture is pumped into the extruders, where the mixture is heated, formed and calibrated. The pipes are cooled using air and cooling water. Subsequently the pipes are cut and stored outside. The facility has 12 extruder lines where pipes are manufactured.

Defective pipes are recycled after grinding the products in a separate room

The cooling water is recycled until the temperature is too high (approximately 20-25 degrees celsius. The water is collected in open drains in the floor and pumped to a stream located to the west of the site where it is discharged.

Three outlet drains are present in the production room. This is another drainage system than the cooling water. The drains were all blocked because of lack of cleaning. No oil spills were noticed near the drains.

The outdoor areas around the buildings are used as access and parking area. The large area to the north of the buildings is used for storage of finished products. Drums, containing a PVC mixture, which can not be recycled, are stored to the north of the production building.

An above the ground storage tank (AST) with a filling station for fuelling the fork-lifts is located at the storage area for finished products. Further details on the storage tanks are presented in chapter 5.2.

Spills

Site management reported that they are unaware of any history of waste disposal, significant spills or leakage of materials or waste on-site apart from the two fillings on-site.

Historical aerial photographs of the subject site were not readily available.

3.3 Current Uses of Adjoining Properties

The site is located in the countryside surrounded by fields and is the only industrial facility in the neighbourhood. Some residential buildings are located within 50 metres to the south of the production building. The village called Skårer is located approximately 1 km to the south of the site.

It is the Consultant's opinion that none of the current surrounding land uses has the potential to have significantly impacted the site in terms of potential soil and groundwater contamination.

3.4 Environmental Setting

3.4.1 Geology and Hydrogeology

The following information is based on information from the municipality of Aurskog-Høland and information from the intrusive investigation.

Regional geology and hydrogeology

The region is covered by at least 10-15 metres of thick clay.

There are no groundwater resources in the area.

Local geology and hydrogeology

Information about the local soil and groundwater conditions is available from the intrusive investigation performed in January 2001 in connection with the present acquisition. The top-soil 0-1 metres below ground level (m b.g.l.) consists of gravel. From the 1 to at least 5 m m b.g.l. thick clay is present. The clay is difficult permeable and no signs of groundwater was noticed on the site.

The buildings and storage area are elevated 10-15 metres compared to the surrounding agricultural fields. In the boreholes, which were performed at the bottom of the slopes, clay was also found from the ground level to 4 m b.g.l.

It is understood that the buildings are founded directly on the clay ground.

3.4.2 Groundwater Interests

The drinking water in the area is abstracted from the lake called "Store Langsjø", which is located near Bjørklange approximately 5 km to the north-east of the site. Based on the procured information no groundwater interests used for drinking water purposes are present in the area.

3.4.3 Surface Waters

The nearest water course is a small stream located to the southwest of the site. The stream is located at a distance of approximately 25-50 metres from the border of the site at a level approximately 15-20 metres lower than the site. The stream is connected to a lake. The cooling water from the production is discharged into the stream.

3.4.4 Site Sensitivity

No specific nature protection areas are located in the vicinity of the site.

The environmental sensitivity of the site is considered to be low with respect to groundwater and moderate with respect to surface water. Surface spills at the facility, which are collected in the storm water system, will be discharged to the stream.

The non-permeable clay will prevent spillages from dissipating readily into the ground.

4 Evaluation of Soil and Groundwater Contamination

4.1 Physical Evidence of Contamination

No physical evidence of significant contamination (e.g. staining or stressed vegetation) was observed during the site visit. However, the site was covered with snow and ice at the time of the visit and the ground could not be seen. The site seems to be clean and tidy and has a good standard of housekeeping.

4.2 Assessment of Existing Reports

No soil and groundwater investigation has been performed at the site prior to the present investigation, hence no reports exist.

4.3 Assessment of Potential Requests and Claims

The Pollution Prevention Act (Forurensningsloven) No. 6 from the 13th of Marts 1981 is the law regulating contaminated soil and groundwater in Norway.

The Pollution Prevention Act is based on strict liability. If the polluter can be found he will be made responsible, otherwise the present owner of the site can be made responsible.

If soil and groundwater contamination is found on the site from the time the saw mill and carpenter shop was in operation, Icopal A/S can be ordered to carry out remedial actions on the contamination, as the companies probably do not exist anymore.

If contamination is present on site, and is caused by the activities of Icopal A/S, the company will be requested to carry out the necessary investigations and remediation.

It is not likely that Icopal A/S will be met with a civil claim from any of their close neighbours within the next 5 years, due to the distance of the neighbours and the local geology (thick clay), which does not facilitate the transport of a possible soil contamination.

There is no reason to believe that the land use of the site will be changed in the future.

5 Information from Site Reconnaissance and Interview

5.1 Introduction

COWI visited the site of the Icopal facility in Høland on the 16th of January 2001. The site visit included a walk over site tour of the interior and exterior of the site, a review of documents and an interview with the day-to-day head Inge Engh. Weather conditions were minus 17 degrees and sunny. Snow and ice covered the area.

5.2 Permits and Supervision

Environmental permits

The company has no environmental permits.

According to the Pollution Prevention Act (no. 6 from the 13th of Marts 1981) industrial facilities, which pollute the environment, must have an environmental permit (utslippstillatelse), covering all environmental issues (waste, noise, wastewater, emissions to air, emergency plans). The Norwegian EPA (Statens Forurensningstilsyn, SFT) states that facilities, which process plastic compounds need an environmental permit, if they process PVC *and* are located near a residential area. The facility in Høland fulfils both these criteria, and for this reason the facility should have an environmental permit according to the Consultant's interpretation of the statement from SFT.

Subsequently to the Consultant's discussion with SFT, the lawyers from Wiersholm, Mellbye & Bech have apparently contacted SFT and was informed that only PVC processing industries with discharge to the environment should possess an environmental permit. In our opinion, the Icopal facility does have discharge to the environment e.g. air emissions.

The companies, which need environmental permits, are divided into three groups, where group 1 comprises the most heavy industries. The company belongs to class three.

Issuing authority

The Norwegian EPA issues the permits. The responsibility with certain types of industries has been delegated to the counties (Fylkesmannen), which in these cases have the issuing authority. The industries, which process plastic, will be delegated to the counties in the near future (according to the Norwegian EPA).

However, for the time being the Norwegian EPA is the permitting authority. Therefore, an application must be submitted to the Norwegian EPA in order to obtain the required environmental permit.

Authority supervision and control

All companies with an environmental permit, must report their environmental performance to the Norwegian EPA every year. As of today no permit exists, the Norwegian EPA does not have supervision with the site.

According to the municipality of Aurskog-Høland, the company is performing satisfactorily, and they do not have any comments regarding the facility. However, no supervision has been conducted on site.

5.3 Use and Storage of Non-Bulk Hazardous Substances

Based on site observations and discussions with site management, a limited range of hazardous materials is utilised in low quantities at the site.

Lubricant oil is used for maintenance of the machines. Approximately 10 drums are used per year. The lubricant oil is stored in the compressor room located in the most western part of the production building (no. 1). A number of 7 drums fitted with taps were placed on a rack. No secondary containment was present below the drums. Cans containing different oil products were located below the rack, directly on the floor. Minor staining could be noticed on the floor (which was painted concrete. The painting was old and the floor could be noticed). No drainage outlets were present in the compressor room.

Lead stabilisers are used on site in the PVC production. The lead stabilisers formulated as PE pellets are stored at the 1st floor in the production room and no spillages are regarded to be likely.

A small amount of methylenchloride is used for testing the products in the laboratory (approximately 20 litres per year). The methylenchloride is stored in the laboratory. It is collected after use and disposed off.

5.4 Bulk Underground/Aboveground Storage Tanks (USTs/ASTs) and Sumps

Technical requirements for storage of oil in underground storage tanks (UST) are regulated in the following guideline:

- Guidelines for measures in order to prevent pollution from underground storage tanks used for storage of oil. 1997-01-31 No. 102.

No regulations exist regarding the storage of oil products in above the ground storage tanks (AST).

No UST's were identified on site. The following bulk AST's were identified on-site:

Above the ground storage tanks (AST's)

A 3 m^3 AST for diesel oil used for fuelling the fork-lifts is located in the southern part of the outdoor storage area for finished products. The tank is from 1998 and is placed directly on the paved surface. In one end of the tank an area with no paving could be noticed. A filling pump is connected to the tank. No signs of staining could be noticed in the snow. The snow and ice made it impossible to notice whether the ground around the tank was stained. A copy of the tank certificate for this tank was provided.

An AST for diesel oil with a volume of 1 m^3, which was used from 1995 to approximately 1998, is still present in the area next to the AST described above. The tank is hanging in a rack, which is standing directly on the asphalt.

Before 1995, the 1 m^3 diesel tank (or maybe drums/cans) was located to the north of the old storage building (no. 3). This storage was moved in connection with the construction of the new storage building in 1995. It was informed that no contaminated soil was noticed during the excavation of the topsoil below the present building. No documentation on this tank was available.

5.5 Storage and Disposal of Hazardous Waste

Hazardous waste is regulated in the Ordinance on Hazardous Waste No. 362 from 1994-05-19. According to this ordinance, the companies are responsible for proper storage and handling of the hazardous waste in order to prevent pollution. In particular, the regulation states that the Norwegian EPA must approve the companies, which dispose hazardous waste.

The transportation of the hazardous waste is conducted by contractors from "Special Renovasjon AS" hired by the waste treatment company called "Renor". Documentation was shown that the waste treatment contractor has the proper licenses issued by SFT.

The hazardous waste generated on site comprises waste oil, oil filters, spray boxes, fluorescent tubes and methylenchloride.

The amount of waste oil generated and brought to Renor in 2000 was 9 drums each containing 200 litres. The amount of methylenchloride constituted approximately 20 litres in 2000.

Furthermore approximately 10 drums with PVC waste, which cannot be recycled in the process, is stored to the north of building no. 2. It is not determined where the waste will be disposed off. However similar waste have previous been sent to "Renor".

Site management reported that the Icopal facility in Høland does not collect other company's waste.

5.6 Storage and Handling of Solid Waste

The handling of solid waste is regulated in the Pollution Prevention Act (no. 6 from the 13th of March 1981).

General wastes generated on-site include paper and cardboard, plastic and combustible waste and domestic waste. The wastes are located in containers situated to the north of building no. 2. The paper and cardboard is collected by "Norsk Gjenvinning" and is recycled. The plastic is collected by "Foldal Gjenvinning". The electronic and electrical waste is collected by Renas as a part of a national collecting system for this type of waste. The remaining waste fractions are collected by a contractor hired by the municipal waste treatment organisation. The site manager assumes that the contractor has the proper licenses. No documentation was available on site.

No waste management licences are understood to be held by the company and it is the Consultant's opinion given our present knowledge of their operations, that none are required.

5.7 PCB-Containing Equipment

According to the Ordinance on PCB (17/4-2000, No. 413) usage of PCB containing transformers and large condensators are prohibited.

A transformer building is located on the eastern side of building no. 2. This is not the property of the company. Aurskog-Høland power station, which owns the transformer station has been contacted. Four transformers from 1995 are present on site according to the power station. The oil in transformers does not contain PCB.

5.8 Asbestos-Containing Materials (ACMs)

Asbestos is regulated in the Ordinance on Asbestos No.600 (1991-08-16) from the Municipal and Regional Department. Generally the AMC may stay on buildings until it has to be replaced. Specific safety measures have to be taken when ACM's are removed, and the disposal shall be performed according the certain procedures by authorised companies. When an asbestos containing roof is removed or repaired, permit from the Working Inspectorate must be obtained.

No comprehensive asbestos survey has reportedly been made on the site. It was noticed that the roof on the office building, which is a part of building no.1, is made of Eternite™, which can be an asbestos containing material. Given the age of the building (1950), the presence of asbestos-containing materials within the buildings is likely.

5.9 Ozone Depleting Substances (ODSs)

No ozone depleting substances were reportedly present on-site. Halons are reportedly not utilised in any fire extinguishing systems/ extinguishers.

5.10 Atmospheric Emissions

In the Ordinance on Air Pollution and Noise (30/5-1997, No. 490) limit values on immission of air pollution and noise from industrial facilities are provided. In the Ordinance, limit values are set for NO_2, dust, SO_2, lead and noise. The supervising authority with air pollution and noise is the County unless the company has an environmental permit issued from the Norwegian EPA. In this case specific demands are provided in the permit.

The facility has the following sources of air emissions:

- Two exhaust outlets from the PVC mixer
- One exhaust outlet from each of the two PVC machines
- One exhaust outlet from the filter cleaning machine

All these outlets are connected to the same outlet on the roof, which is provided with a filter. The filter is changed and cleaned when needed (at least twice a year).

- Furthermore, point exhaustion is installed at certain work locations: One at the mechanical workshop where welding is conducted and one at a machine, which welds pipes.

The production facility is ventilated by inlet of air and passive outlet of the air again.

No measurements of the emissions from the facility are performed.

Given the nature of activities undertaken at the site, it is considered that measurements of the air emissions should be performed from the PVC lines. It is possible that lead is emitted from the outlets. This will most probably be regulated in the required environmental permit, which the facility does not possess.

5.11 Noise, Dust and Odour

External noise

The following immission limit values for external noise from industries are given in "Ordinance on Restrictions of Noise from Industrial Facilities" TA-506 issued by the Norwegian EPA in Marts 1985:

- Residential areas (day, 6 am-6 pm): 50 dB
- Residential areas (evening, 6 pm-10 pm and Sundays, 6 am-10 pm): 45 dB

- Residential areas (night, 10 pm-6 am): 40 dB

With regard to external noise, no significant emission of noise was observed during the site visit.

Management reported that they received a nuisance complaint regarding noise in October 2000 as a result of their operations. One of the neighbours in the residential quarter located south of the facility had complained to the municipality of Aurskog-Høland about noise originating from three sources at the Icopal facility:

- Unloading of raw materials from the trucks to the silos
- Noise from hatches in the roof construction
- Noise from a door into the production room, which sometimes is open

In a letter to the municipality dated 2000-10-24, Icopal refers to a noise investigation, which was conducted in July 2000 by a company called "Brekke and Strand". The investigation was conducted while raw material was unloaded from a truck. The investigation showed that the limit values in the Ordinance from the Norwegian EPA was not exceeded. Icopal states in the letter to the municipality, that abatement measures will be looked into concerning the noise from the hatches even though the limit values are observed.

The residents in the village called Skårer located nearby Icopal complained in February 1999 to the municipality of Aurskog Høland about the heavy traffic to the site passing through the centre of the village. Heavy trucks pass through the village 50 times a day and the road is not built for this type of transports. Hence they complained that the road is ruined, vibrations means that the buildings are cracking and it is not safe for the residents to use the road. Furthermore the residents complained about noise from the trucks, which are idle running at night.

The municipality has proposed that a new road to the facility should be financed partly by Icopal AS. However Icopal does not agree, as they think that the municipality should be obligated to provide and maintain access roads to the plant.

Different possible new road suggestions have been put forward and the costs for the likely solution is 2 mill NOK. This will probably be financed by the Norwegian Road Authorities and the municipality of Aurskog-Høland. Furthermore the outdoor storage area is not designed for the heavy load from the trucks with the raw materials. The municipality wants Icopal to finance the improvement of the storage area. However, Icopal has declined this in a letter dated 2000-12-11 and proposes that the trucks with the raw materials should still be able to use the present road while the trucks with the finished products could use the new access road.

The road authorities in the municipality of Aurskog-Høland have been contacted. The municipality stated that they have not determined how to proceed with the road as budget is not allocated to the project. However as long as Icopal refuses to co-finance the road, it is not likely to be constructed.

Odour emissions

No odours were noticed outside the production buildings during the site visit. No measurements of odour have been conducted.

Management reported that they had never received any statutory nuisance complaints regarding odour as a result of their operations.

5.12 Wells and Water Supply

The site is supplied with water for all means from the public water supply. Icopal uses water for sanitary purposes and as cooling water in the production. The yearly amount of cooling water used for the production was unknown to the site management. Readings have been performed of the water gauge in week 5 and 6. The water consumption in these two weeks was 10423 m^3 and on this basis, the annual consumption of water has been calculated to be in the order of 270,000 m^3.

The facility does not pay for the amount of water used. A fixed fee is paid corresponding to the area of the production hall. The company should take into account that the costs for water could be raised considerably, if the payment in the future is going to be settled according to consumption.

5.13 Wastewater and Septic Systems

The discharge of the wastewater and cooling water shall be regulated in the environmental permit, which the facility does not have.

The storm water from the site is collected in a drainage system and is discharged to a ditch on the northern and western side of the site. The ditch runs into a stream located to the south-west of the site.

The cooling water from the production is collected in drainage wells in the floor in the production building and discharged to the small stream to the south-west of the site. The annual discharge to the stream is in the same order as the water consumption (270,000 m^3) as only small amount of water is used for sanitary purposes and the evaporation is negligible. No monitoring is carried out on the wastewater. According to the site management, the manufactured pipes are approved as transport pipes for potable water and for this reason the pipes should not deliberate any chemicals to the cooling water. The temperature of the discharged water is 20-25 degrees celsius.

Domestic wastewater from the facility is discharged to the municipal sewer system. The wastewater is treated at the municipal treatment plant.

The three drainage wells in the production room are connected to an oil separator located to the south of building no. 2. The drains are more or less blocked, as they have never been cleaned out. The oil separator is from 1995 and made by fibre glass. It has never been emptied. The oil separator could not be inspected at the time of the site visit due to ice.

A washing place where the fork-lifts are cleaned is located to the east of the production building. The area is paved with asphalt and a drainage well is located in the area. The trucks are washed and serviced outside the site.

5.14 Health and Safety

In Norway, health and safety issues is regulated through Ordinance on Health, Environmental and Safety in Industrial Companies (Internkontrollforskriften) No. 1127 from 1996-12-06. The Ordinance demands that the company has established a health and safety committee.

At Icopal Høland, the health and safety committee has meetings 4 times a year and internal audits are conducted twice a year. Furthermore the company must submit a yearly report to the Working Inspectorate describing the health and safety work in the company.

The health and safety committee in Høland consists of the site manager, Inge Engh, the technical director of the pipe division, Michael Malling, and employee representatives.

The annual reports to the Working Inspectorate for Icopal AS pipe division for 1997, 1998 and 1999 was handed over to the Consultant. A letter from the Working Inspectorate dated 2000-07-20, stated that they had no remarks to the report from Icopal pipe division, which was submitted in 1999.

Internal safety training is provided to new employees.

According to Inge Engh, two serious working accidents have occurred during the last 1-3 years, an eye accident and a head injury. Minor accidents occur 1-2 times a year. The typical accidents are cuts, squeezes and falls. The accidents are reported to the Working Inspectorate. No claims regarding accidents exists according to Inge Engh.

The employees are subjected to medical examinations at a local medical clinic every year. The employees, who are working at the PVC lines are furthermore tested for the content of lead in their blood. The results are confidential and only accessible to the workers. The company has been informed that the values were normal.

Protection masks are used in the mixing room.

An emergency plan with a fire training program is being elaborated. The local fire department is acting as consultants in the process. The facility is classified as a "special object of fire".

In-door Air Quality

A measurement of the lead concentration in the air in the production building was performed in 1998. The samples were collected by employees at Icopal during their working hours, the sampling collectors were fixed on the clothes of the employees in the PVC mixing room and in the production room. The filters were analysed by the Norwegian National Health and Safety Institute.

The content of lead in three of the samples from the PVC mixing room was 0.0008 to 0.017 mg/m^3 while one of the samples showed a content of 0.192 mg/m^3, which is above the indoor air quality criteria on 0.05 mg/m^3 from Ordinance No. 0361, 1996-02-01 "Veiledning om Administrative Normer for forurensning i Arbeidsatmosfære". In the mixing room protection masks are used.

The results from the production room showed that the content of lead in 3 of the 5 sampling locations were 0.0003 to 0.0045 mg/m^3. Two of the samples exceeded the indoor air quality criteria for lead of 0.05 mg/m^3, with values of respectively 0.055 mg/m^3 and 0.079 mg/m^3.

According to Icopal these results were extraordinary, as the results from the mixing room were high due to change of filters at the outlet and to manual filling of lead containing resting compounds to the production lines. This procedure has been changed, and the filling is now automatically executed.

The Working Inspectorate has not been informed about the results of the air quality measurements.

Internal Noise

The internal noise on Norwegian industrial facilities is regulated by the Ordinance "Noise at the Workplace" No. 398A from the Working Inspectorate.

The maximum allowed noise level is 85 dB in production halls with noisy machinery. The usage of hearing protection is mandatory when the noise level exceeds 85 dB. Signs must be present in areas where the noise level is higher than 85 dB.

The internal noise level is high in the production building, especially in the grinding room, where obsolete pipes are grinded and recycled. Measurements of the internal noise level were conducted in 1997 and will be performed again in 2001. The measurements were conducted internally by an employee and can be regarded only as an indication of the noise level in that very moment. The noise level in the production room was generally below 85 dB with exception of when the saw was running at the oldest production lines. The noise level in the grinding room was 100 dB.

Hearing protection is used in the production.

It our opinion the noise level in the production room complies with the ordinance. The elevated noise level in the grinding room can probably not be re-

duced due to the grinding activity. The door to the grinding room should be closed. Hearing protection is mandatory in the grinding room.

To reduce the noise of the grinding activities, significant investments may be required (isolation, re-organise the feeding from outside the room)

Generally safety issues seem to be well managed at the site.

6 Findings

Based on the review of available information, recognised environmental conditions were found to be associated with the property.

The following potential sources of soil and groundwater contamination have been identified from the assessment:

- A 3 m^3 AST for diesel oil used for fuelling the fork-lifts is located in the outdoor storage area. The tank is 2-3 years old and is placed directly on the paved surface. In one end of the tank an area with no paving could be noticed. A filling pump is affiliated with the tank. No signs of staining could be noticed in the snow. The snow and ice made it impossible to notice whether the ground was stained.

- A diesel oil tank, with a volume of 1 m^3, which was used from 1995 to approximately 1998, is still present in the area next to the above-described AST. The tank is hanging in a rack, which is standing directly on the asphalt.

- Before 1995, the 1 m^3 diesel tank (or maybe drums/cans) was located to the north of the old storage building. This storage was moved in connection with the construction of the new storage building in 1995. It was informed that no contaminated soil was noticed during the excavation of the topsoil below the present building. No documentation was available.

- A 10 m^3 UST for fuel oil was dug up in 1995. The UST had been located in the ground since approximately 1952 and had been used by Icopal from 1964 to 1988. According to information from the employees no contamination was noticed around the tank at the time of the excavation. No documentation could be procured concerning the state of contamination around the tank. A new production building has been constructed on top of the old tank pit.

- An oil separator is located to the south of the production building. The oil separator is from 1995 and is connected to the three drainage outlets in the production room. The drainages in the building are apparently closed by solid materials because of lack of cleaning. The oil separator could not be opened due to the frost. It has never been emptied.

- A washing place where the fork-lifts are cleaned is located to the east of the production building. The area is paved with asphalt and a drainage well is located in the area. The trucks are washed and serviced outside the site.

- The two waste fillings located on the property can contain contaminated soil or other contaminated materials.

Major non-compliances or matters of bad household, which in the future can result in noticeable liabilities:

- The two fillings located on the western part of the site have been approved by the municipality of Aurskog-Høland (by telephone only). According to the site management, the municipality has encouraged the establishment of the fillings and has also disposed surplus soil from different construction sites in the village on the subject sites. However, the municipalities in Norway have no provision to approve the establishment of fillings. The county to approve the fillings is the County of Oslo and Akershus, which must receive a written explanation of the filling (age, content, amount of deposited types of waste and soil etc.) in order to determine how this issue can be solved. It can not be excluded that the county will demand the fillings to be moved to an authorised landfill.

- The Norwegian EPA (Statens Forurensningstilsyn) has been contacted in order to verify, whether the production facility needs an environmental permit (utslippstillatelse). SFT states that facilities, which process plastic compounds need a discharge permit, if they process PVC *and* are located near a residential area. The facility in Høland fulfils both these criteria, and for this reason the facility should have an environmental permit. An application must be sent to the Norwegian EPA in order to obtain the permit. The conditions in the permit may impose certain environmental measures as well as future monitoring e.g. on air emission.

- The residents have complained about noise, vibration and the safety in connection to the heavy traffic through the village. A new access road to the facility is planned and communication between the municipality and the company is on-going concerning financing the road. The company claims that the municipality should finance a new access road, if it is needed, as it is an industrial area and the residential area has been built later on. The outdoor storage area is not designed for the heavy load from the trucks carrying the raw materials. Depending on how the company in the future will be connected to the municipal road, the transport road through the storage area may have to be improved. The municipality states that the access road will probably not be constructed unless Icopal agrees to take part in the financing. Total construction costs for the access road are estimated at approx. EUR 500,000.

- Measurements of the content of lead in the internal air in the production room and mixing room, have shown that some of the workers are exposed to lead concentrations which exceeds the limit values given in the Ordinance for indoor air quality. According to the site management these lead

concentrations was caused by extraordinary conditions which has now been changed.

7 Recommendations and Costs

Below some actions are recommended. Some of the actions can act as pollution prevention during the future activities on site. The purpose of the soil and groundwater investigation outlined below is to determine the state of contamination at the time of the acquisition. It can not be excluded that some of the contamination on site in the future can affect the present activities on site. The investigation is therefore proposed to be performed in order to know the fully extent of contamination on site.

The following actions are recommended:

- We propose to perform an intrusive investigation comprising performance of 10-15 boreholes located at the potential sources of contamination.
- The county of Oslo and Akershus should be contacted in order to solve the non-compliance issue regarding the fillings. A written explanation should be elaborated describing the fillings (age, size, type of materials etc.). The County of Oslo and Akershus is the authority to approve the landfills. Tentative cost estimate EUR 7,500-15,000.
- An application should be sent to the Norwegian EPA in order to obtain the required environmental permit. Tentative cost estimate EUR 10,000-15,000.
- Regarding the content of lead in the air in the mixing room and the production room verification is recommended.
- As a matter of "best practice" the working environment should be given attention with regard to the listed problems with the internal (and external) noise level. Tentative cost estimate EUR 50,000-80,000.
- As mentioned above, a new access road to the facility is planned and communication between the municipality and the company is on-going concerning financing the road. The municipality states that the road will probably not be constructed unless Icopal agrees to take part in the financing. The total costs for the likely solution were estimated at EUR 250,000 (2 mill NOK).

It is possible that considerable liabilities are connected to the above mentioned environmental issues. However the magnitude of order depends on the decisions made by the authorities especially regarding the fillings.

Phase II Assessment

The Phase II soil and groundwater investigation, as recommended above, was carried out after the phase I assessment and reported separately (Tauw report R008-3911373KEB-D01).

In this investigation content of total hydrocarbons, toluene and chloroform was found in the south-western filling, indicating that the filling contains contaminated soil.

Also a content of total hydrocarbons was detected in soil next to the 3 m^3 AST, indicating that spill occurs when refuelling the fork-lifts and/or filling the AST.

Furthermore elevated concentrations of chrome and arsenic were detected in several of the borings and also in the original geological materials. It therefore seems that the elevated content of chrome and arsenic is due to a natural high content in the soil in the area. In one soil sample of the backfill at the site a content of zinc above the criteria of sensitive land use issued by the Norwegian EPA was found.

A water sample taken at the base of the north-western filling showed contents of xylenes and methylethylketone. The content of xylenes and methylethylketone indicates that the north-western filling contains contaminated soil. In the same water sample a content of nickel higher than the Dutch Target Value was detected.

As mentioned above, the two fillings are verbally approved by the municipality, but not by the County, who according to the legislation, is the responsible authority to issue a permit.

It is recommended to stop any further filling at the site. We recommend elaborating a historical investigation of the type of soil and other materials deposited in the fillings. It is likely that the county will demand further intrusive investigations of the fillings performed. The cost of a historical review and a detailed investigation including the performance of 10-15 boreholes on each filling is approximately 30,000 EUR. If further investigations shall be performed, it is recommended to carry them out during the spring/summer, when the snow has melted.

Although we assess it as less likely, it can not be excluded that the County will demand the fillings to be moved to an authorised landfill. Especially as this investigation shows that contaminated soil has been deposited in the filling. We estimated that approximately 60,000 m^3 are deposited in the two fillings. The removal, transportation, disposal of soil and refilling with clean materials of the 60,000 m^3 may cost in the order of 5 – 10 mio. EUR based on current Norwegian prices. This estimate should be considered as a worst case estimate. A more pragmatic and cost efficient approach may consist of isolation and monitoring measures.

The amount of contaminated soil found by the 3 m^3 AST is not known, but assuming a total volume of 50 m^3 the cost of removal, transportation, disposal of oil contaminated soil and refilling with clean materials will be in the order of 15,000 EUR.

Figure 1
Site location, Høland, Norway.

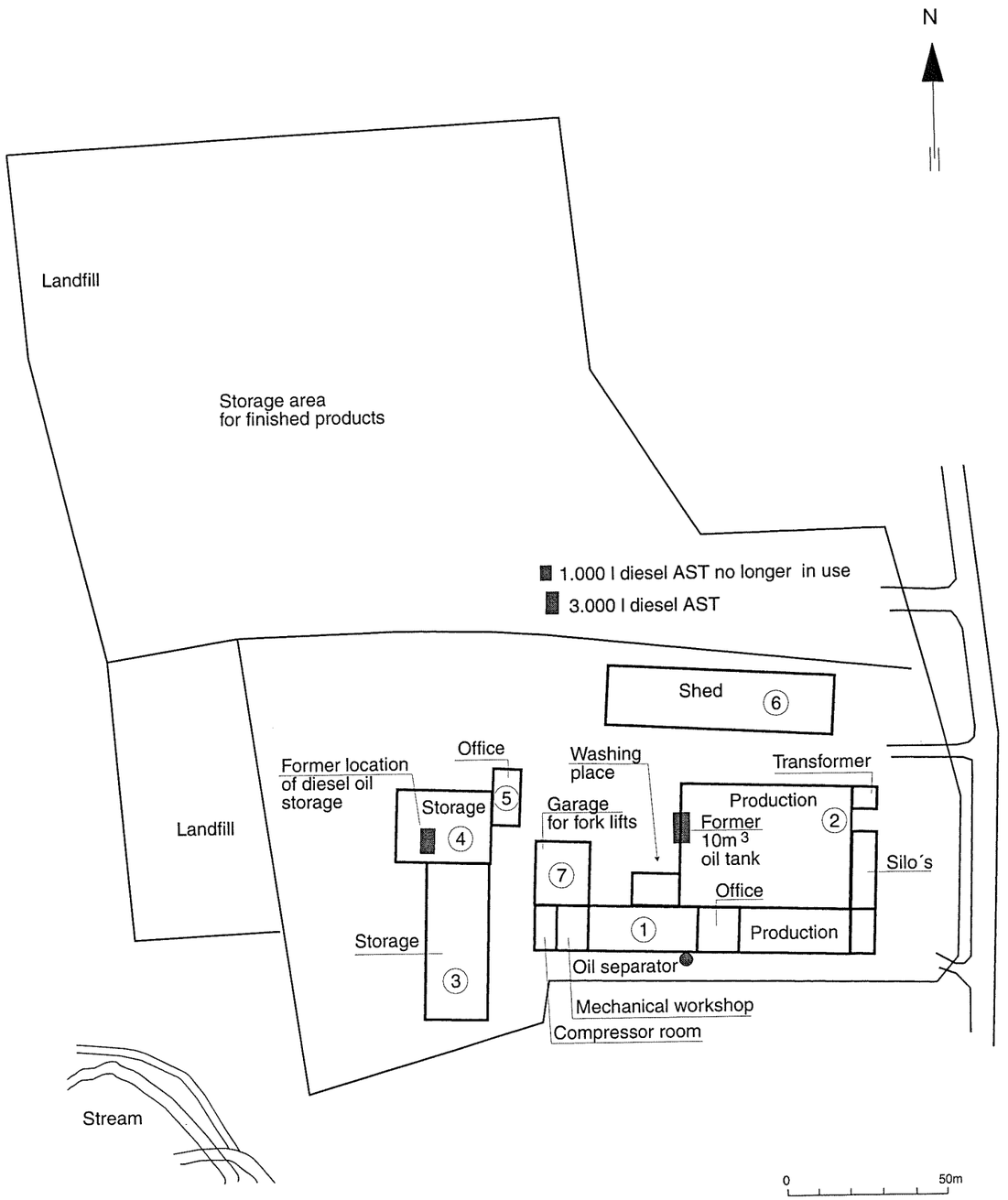

Figure 2
Site location plan, Høland.

Storage of oil products and waste oil

The two AST's for diesel oil

Storage of lead containing products on an inserted deck

Storage of masterbatches in the shed