Conference Proceedings

Waste Water
- The Big Issue

Seafish Report No. SR521

September 1998

SEAFISH

The Sea Fish Industry Authority

Seafish Technology

Conference Proceedings

Waste water - The BIG ISSUE

These are the proceedings of the Seafish Conference Waste Water - The BIG ISSUE held at Woodhill House, Aberdeen on 14 July 1998

Seafish Report No. SR521

R. B. Watson
September 1998

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Welcome and Introduction

Councillor Paul Johnston
Aberdeenshire Council

Welcome and Introduction

Councillor Paul Johnston, Aberdeenshire Council

Councillor Johnston welcomed delegates to this conference which Aberdeenshire Council was pleased to assist in hosting. He recognised that in setting out on a long road, beset with problems, 'forewarned is forearmed'. He felt that the Waste Water Directive would create a complexity of problems. The industry would have to measure them and then make a balanced judgement. He also pointed out that the north east of Scotland is not alone in facing up to consequences which might prove detrimental to some businesses - others, eg the Danes, have similar problems in implementing the Directive.

He emphasised that this conference would be about information, which the Council will need if it is to influence decision making. This should be through careful, balanced argument, and not through column inches in the Press.

He reiterated that today is the beginning of a long process, and asked that the conference welcome its guide through this process - the Chairman, Alasdair Fairbairn.

Chairman's Introduction

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Chairman's Introduction

Alasdair Fairbairn, Chief Executive, Sea Fish Industry Authority

Thanks to Councillor Johnston, Aberdeenshire Council and delegates.

Environmental issues are becoming of increasing concern for everyone. The fish industry needs the seas to be clean and should welcome environmental legislation designed to achieve that. But, all such cleaning up operations have a cost and in this case it impinges directly on coastal processors.

The EU Urban Waste Waters Treatment Directive will require by law that discharges to the sea are suitably treated. Historically, in coastal areas where most fish processing is concentrated, our human and industrial effluent has been simply pumped out to sea at negligible cost. However, the Directive requires that by 2001, all discharges to the sea are suitably treated. New treatment plants will have to be built and operated, at considerable cost. For example, Yorkshire Water plc are investing £200 million in a sewage scheme for Hull. Fish processors produce large quantities of effluent and, under the 'polluter pays' principle, will face massive increases in discharge costs in order for that effluent to be treated. These costs may threaten the viability of many processors if they don't reduce the amount and strength of effluent they produce. Some companies are already facing this problem and trying to find ways of reducing these costs. It has to be said that inland industries, including food businesses and some fish processors, have for a long time had to deal with these problems and already meet the costs.

You may be aware of the creation of the Fish Industry Forum. This conference stems from the deliberations of the Forum's cross-sector Working Party on food and related environmental legislation. The Working Party recognised the particular problems faced in the NE concerning waste water and asked Seafish to arrange a meeting of all the parties involved: NOSWA, SEPA, SOAEFD, and industry etc to discuss the issues. The problems include concentration of fish processing in some towns of relatively small population which produces disproportionately large and often seasonally variable quantities of effluent. This makes the capital investment decisions and cost attribution very difficult and there is a great need for all involved to discuss this constructively. The law requires that something has to be done, and together we should be seeking the best solution (which in a financial sense is the least worst solution). Seafish has been studying the technical problems and is of the view that processors themselves can dramatically improve their efficiency of water use and reduce their effluent production.

The purpose of this conference is to present the legal issues which will, sooner or later, bring extra costs for coastal processing companies and to suggest ways in which processors can reduce those cost increases, if they start taking appropriate action now.

Paper 1
Implications of the Urban Waste Water Treatment (Scotland) Regulations 1994. SI 2842

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Implications of the Urban Waste Water Treatment (Scotland) Regulations 1994. SI 2842

Dr R Allen, Sea Fish Industry Authority

1. Principles of EU and UK Waste Water Policy

1.1 Prevention of environmental pollution

One of the fundamental objectives of EU and UK environmental policy is the reduction of water pollution and the improvement of water quality. Inadequately treated urban wastewater as well as toxic chemicals, oil, metals and radionuclides, which are more usually associated with pollution incidents, can all adversely affect the flora and fauna in the environment.

1.2 Creation of a level playing field

Pollution due to inadequate treatment of wastewater from one state or community often influences the water quality in other states or communities. Therefore, under the EC Treaty, legislation aimed at improving the environment by controlling, reducing and preventing pollution has been implemented on a European wide basis.

1.3 The polluter pays

A major objective of the Water Framework Directive is that all water service providers (WSPs) will be obliged to implement full cost recovery charging schemes for all services related to wastewater treatment.

There is also the very distant possibility that 'incentive' charges, economic instruments or pollution taxes may be introduced as disincentives to the discharging of polluting material.

2. Wastewater discharges

In practice the above principles are applied in the UK by controlling trade effluent discharges and there are in reality only two types of discharge possible.:-

2.1 Discharge to public sewer

This requires a consent from the owners of the sewer *i.e.* the water service provider (WSP). The consent will be conditional on a number of parameters *e.g.* volume, effluent strength, toxicity *etc.* which will have set limits. Trade effluent charges will be levied and effluent monitoring will be carried out to ensure that consented limits are not exceeded.

2.2 Discharge to nearby waters

This requires the consent of either the Environment Agency or Scottish Environmental Protection Agency (SEPA). The consent will be highly conditional and dependant on the

sensitivity of the receiving waters. Monitoring will be carried out to ensure compliance with the consented limits for which a charge will be made. Increasing environmental concerns will make consents for direct discharging more difficult to obtain.

WSPs who in turn directly discharge to nearby waters are now being restricted by the EU Urban Waste Water Treatment Directive (UWWTD) which has been enacted in UK legislation.

3. Urban Waste Water Treatment Directive

Implementation of the directive is being phased over the period 31-12-1998 to 31-12-2005. The compliance dates vary for specified volumes and strengths of wastewater and the sensitivity of the receiving waters, but the main effects will be implemented by the end of the year 2000.

It is the responsibility of the WSPs to comply with the UWWTD. Hence they have to build any necessary wastewater treatment plants (WTP) by, in the main, the end of the year 2000. The costs of building and operating these plants will be passed on to the producers of the wastewater - *i.e.* 'the polluter pays'.

This presents particular problems in coastal regions where WSPs have historically disposed of wastewater directly to sea, whereas inland WSPs have provided sewage treatment facilities since Victorian times. Discharge consents and charging schemes have thus been applied to inland industry, including fish processors, for many years and it is not uncommon for large inland businesses such as food processors, breweries *etc.* to build their own effluent treatment plants or go into partnership with their WSP to build and operate such plants.

Countries such as Germany, Holland and Denmark already have very strict controls on wastewater discharges to the environment. Even within the UK, pressure from environmental groups has resulted in Yorkshire Water plc going beyond the requirements of the UWWTD and providing Ultra Violet disinfection of discharges along the East Yorkshire coast.

4. Stages of Effluent Treatment

Effluent treatment can be categorised into five main stages:

4.1 Preliminary treatment

The removal of large floating and suspended solids followed by the removal of grit and sand.

4.2 Primary treatment

The use of physical methods such as screens, settlement tanks, to remove solids. These processes may be assisted by the addition of chemicals such as lime.

4.3 Secondary treatment

Biological Treatment *i.e.* using the natural growth of microbes feeding on the constituents of the effluent thus reducing its strength and concentrating the contamination in the form

of a biological sludge, the sludge can then be separated from the effluent *e.g.* the activated sludge process.

4.4 Tertiary treatment

Optional final polishing processes *e.g.* disinfection (Ultra Violet light, chlorination *etc.*), ion exchange, activated carbon, *etc.* which may be required depending on the nature of the raw wastewater and the receiving waters.

4.5 Sludge treatment

Prior to disposal the sludge has to be made safe by destroying the pathogenic organisms and processed into a form that can be easily disposed of *e.g.* thickening, drying *etc.*

5. Effluent Strength

Effluent strength can be measured by a number of parameters:-

BOD - Biochemical Oxygen Demand

A measure of the oxygen required (mg/l) for the biochemical degradation of organic material and the oxygen used to oxidise inorganic material such as sulphides and ferrous iron.

COD - Chemical Oxygen Demand

A measure of the oxygen equivalent (mg/l) of the organic matter that is susceptible to oxidation by a strong chemical oxidant.

SS - Suspended Solids

The amount of solid material (mg/l) suspended in the effluent.

6. Wastewater Treatment Charges

In the UK nearly all trade effluent charges have been based on the Mogden Formula since the late 1970s . The formula was introduced to provide a method of calculating charges which was practicable and compatible with a long term strategy of marginal cost charging. The formula attempts to represent the cost of treating trade effluents. The formula relates effluent treatment charges to their volume and the costs associated with the removal of BOD and SS from effluent. Hence the larger the volume and the higher the strength the higher will be the charges.

7. Important Issues for Wastewater Treatment in the Grampian Region

A high proportion of the wastewater, in relation to the size of the population, is derived from the Grampian fish processing industry. The seasonal nature of the pelagic fish processing industry results in massive variations in wastewater volume and strength. These factors make it extremely difficult for WSPs to determine the size and processes needed to meet the requirements of the UWWTD. The costs of building and operating these new WTPs will be met by levying treatment charges which will be based on the 'polluter pays' principle *i.e.* using the Mogden formula.

The size and processes of the Aberdeen WTP will be relatively easy to determine because of the stable population size and relatively consistent, with respect to volume and strength, industrial wastewater. However, in Fraserburgh and Peterhead, with population sizes of about 15,000 and 20,000 people respectively there are massive industrial wastewater variations, rising from the equivalent of several thousand people to that of hundreds of thousand of people depending on the fishing season. Therefore the size and processes of the WTPs to treat varying loads will be extremely difficult to determine.

The available options for the WSPs lie between two extremes of (i) WTPs capable of treating everything and (ii) WTPs capable of treating the domestic wastewater only, forcing industry to treat its own wastewater.

At one extreme, large and complex to operate WTPs capable of treating large and fluctuating loads would have to be built. This would be costly for all wastewater producers and treatment costs could escalate further if, after coming into operation, major effluent producers decided to treat their own wastewater or leave the area, leaving overcapacity WTPs.

The other extreme would be the cheapest option for the WSP. Insuffient capacity to treat industrial waste water at small WTPs would force the WSPs to introduce very tight consents to discharge. Under these circumstances some companies may be unable to meet the strict discharge consents, they may be unable to afford their own treatment facilities or company treatment may be impracticable.

A compromise solution between the two extremes will require WTPs to be capable of treating all of the domestic wastewater, including any envisaged population expansion, plus capacity to treat some industrial wastewater.

To achieve an optimal solution all companies must minimise their effluent volumes and strengths, which will reduce their own trade effluent charges, and the WSP will set reasonable consents to discharge. Some companies will find it cost effective to treat or partially treat their own wastewater and some industrial wastewater may be directly discharged to sea after being treated to the required standard. Groups of companies could form consortia to carry out their own wastewater treatment and possibly discharge directly to sea.

Such actions by industry and the WSPs would dramatically reduce the seasonality of the wastewater volume and strength to be treated by the WTP and some companies / consortia would have to provide treatment facilities. Such a compromise may provide the cheapest overall option for both industry and the WSPs. However, there are major difficulties in quickly (i.e. before 31-12-2000) finding the best overall solution in a changing and very complex background.

In working towards a compromise solution the WSPs will need to know what is going to be achieved by effluent minimisation and, more difficultly, predict the size of the fish processing operation in these towns over the next 25 years. Finding the best compromise solution will not be easy and will require dialogue between the fish processing industry and the WSPs, but the consequences of not achieving an optimal solution will be expensive for all concerned.

Paper 2
Water Use and Effluent Production in Fish Processing

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Water Use & Effluent Production in Fish Processing

Michaela Archer, Sea Fish Industry Authority

1. Introduction

From 2001, when the requirements of the Urban Waste Water Treatment Directive come into force, trade effluent charges will increase dramatically, particularly in coastal areas, which will affect the majority of the fish processing industry. The future charges will be calculated by the Mogden formula and will depend on the strength and volume of the discharged effluent; the stronger the effluent and the greater the quantity, the higher the disposal costs. This will have a significant effect on the fish processing industry as it produces large volumes of effluent, with a high level of organic contamination.

This paper discusses water use and effluent production in fish processing. It highlights some of the work that Seafish has been doing to identify potential problems and some of the differences found between processes and companies, in terms of both water use and effluent production. It also shows some of the typical costs which may be faced by fish processors in the future, based on the work that Seafish has done to date.

2. Seafish Technical Work

To determine the inevitable cost increases that fish processing companies will face and to identify ways of reducing these costs, Seafish has worked closely with many companies throughout the UK to identify ways of reducing both water use and effluent production in fish processing.

Brief waste surveys were carried out in a number of whitefish, pelagic and shellfish processing companies throughout the UK. With European funding arranged through Yorkshire Enterprise Ltd, approximately fifty companies in the Humber region received a free waste survey by a consultant. Unfortunately there was no similar funding available in the North-East region of Scotland. Following on from the waste surveys, Seafish carried out more detailed water and effluent audits in seven representative whitefish processing companies. These audits covered a range of processing operations including hand and machine filleting, skinning, defrosting, smoking and enrobing in businesses varying in size from 10-50 employees. Seafish will also be fully auditing pelagic and shellfish companies and these will be at factories in Scotland.

3. Water Use in Fish Processing

A clean supply of water is an essential part of fish processing to maintain high standards of quality and hygiene.

Water is generally used in all fish processing operations, but some processes use much more than others. From the findings of the audits carried out in whitefish processing companies, filleting, defrosting and cleaning are the main processing operations which use the greatest amount of water. Obviously this may not be the case in pelagic and shellfish plants.

Significant differences were found in the amount of water used between companies and different processing sectors. To highlight these differences, the volume of water used to produce 1 tonne of product was calculated (Table 1). These figures are based on the detailed audits and the waste surveys. As an example of the differences found, from the whitefish processors who defrost and fillet fish, one company uses 9.5m^3 of water to produce 1 tonne of whitefish fillets, whereas another uses 24m^3 of water - a difference of 14.5m^3 to produce the same weight of product. The figures for pelagic and shellfish processors are based only on the limited waste surveys carried out. It is likely that water consumption per tonne of product in these sectors could be significantly higher than the figures shown here.

Table 1 - The variation in the volume of water used to produce one tonne of product

Main processing operation	Volume of water used to produce 1 tonne of product (m^3/tonne)		
	Min	Max	Average
Whitefish			
- Filleting	5.0	7.4	6.3
- Defrosting & filleting	9.5	24.0	15.7
Pelagic*	5.4	33.3	11.1
Shellfish*	0.5	20.0	7.0

* Based only on waste surveys

The variation in water use, particularly in companies carrying out the same processing operations, highlights that while some companies use water relatively efficiently, others waste a significant amount. Wastage is primarily due to two factors; bad practices and inefficient/ineffective equipment. To help reduce future costs, fish processors must find ways of reducing their water consumption.

4. Effluent Production in Fish Processing

In fish processing, wherever water is used, effluent is produced. Effluent is basically waste water and in fish processing is the result of water becoming contaminated after it comes into contact with fish. The problem with fish processing is that it is a very wet process and the nature and composition of fish results in a large amount of organic contamination in the effluent.

The Mogden formula measures effluent strength in 2 ways:

- soluble components dissolving in the water e.g. blood and protein. This is measured by chemical or biological oxygen demand (COD or BOD).

- solid material becoming suspended in the water e.g. small pieces of fish. This is measured by suspended solids (SS).

When a water company or authority wants to determine a company's trade effluent charge, the effluent will be tested for these two components as they are indicators of the strength and hence the treatment costs of the effluent.

Because of its nature, leaving fish or bits of fish soaking in water over time, or breaking fish up into smaller pieces can cause the strength of effluent to increase significantly. Processing operations which introduce other contaminants, such as fish guts, batter, oil or brine into effluent produce exceptionally strong effluent streams which will affect the overall strength of effluent leaving the factory. Typically, a processor who enrobes fish or processes ungutted fish generates much stronger effluent than one who only fillets (whitefish). Pelagic processing produces a particularly strong effluent because of the high oil content and the guts.

The strength of effluent streams generated by different whitefish processing operations and the associated future charges are shown in Table 2. It is apparent that a typical whitefish enrobing process results in the production of very high strength effluent when compared to whitefish filleting alone. The charges are calculated using Yorkshire Water figures (1997-98)

Table 2 - The strength and future charges of different effluent streams generated by some different whitefish processing operations (Yorkshire Water figures 1997-98)

Processing Operation	Average current charges (£ / m^3)	Estimated future charges (£ / m^3)	Increase in costs
Enrobing	0.20	39.42	20,000%
Filleting	0.20	0.97	485%
Defrosting	0.20	0.50	250%

By taking samples from the main drains in different factories, Seafish has calculated the strength and estimated future trade effluent charges for effluent discharged by different types of processors (Table 3). The figures for pelagic and shellfish processors are based only on the waste surveys and may not be fully indicative of the potential cost increases. The difference in future Mogden calculated charges highlights that some processors will be charged a lot more than others because of the type and nature of the processing operations they carry out.

Table 3 - The strength and estimated future trade effluent charges for effluent discharged by different types of processor (overall effluent strength)

Type of Processor	Average current charge (£ / m^3)	Estimated future charge (£ / m^3)	Increase in costs
Whitefish			
- primary processing	0.20	0.97	485%
- primary processing and enrobing	0.20	8.57	4,285%
Pelagic*	0.20	4.54	2270%
Shellfish*	0.20	1.03	515%

*Based only on waste surveys

Whilst carrying out the audits, Seafish identified that the strength of effluent produced in almost every processing operation was excessively high, resulting from a combination of bad practices and poorly designed equipment or facilities. By changing practices and modifying equipment, the strength of effluent produced in each processing operation could be significantly reduced. This would then reduce the strength and subsequent treatment costs of effluent leaving the factory.

5. Potential Cost Increases

To highlight the effect of this legislation, Table 4 shows examples of two companies in the Yorkshire Water region and compares their current and future bills, based on the volume and strength of effluent currently discharged. It is apparent that there will be a substantial increase in costs for both these fish processing companies.

Table 4 - Examples of the increase in costs when Mogden calculated effluent charges are introduced to two fish processing companies in the Yorkshire Water region

Company	Fish Processed	Turn-over	1998 Charges		2001 Charges		Increase in Charges
			Water	Effluent	Water	Effluent	
1	Whitefish	£1m	£9,581	£2,600	£11,091	£12,613	x 2
2	Dogfish*, Whitefish	£15m	£23,010	£5,850	£26,600	£347,225	x 13

* dogfish preparation resulted in very high strength effluent production

There is insufficient information available at present to calculate similar figures for pelagic processors, but based on Seafish's preliminary work it is expected that the increase in bills could be significantly higher than for other types of processor.

6. Conclusions

The introduction of this legislation will bring a significant financial problem to the fish industry. All of the figures included in this paper are based on the assumption that a company does nothing about reducing their effluent strength or water use. However, from the results of Seafish work it is clear that there is significant scope for reducing both water use and effluent production in fish processing companies, which in turn would reduce the potential future costs considerably.

Paper 3
Common Problems and Solutions

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Common Problems and Solutions

Richard B Watson - Sea Fish Industry Authority

1. Introduction

The previous talk emphasised the seriousness of the future costs facing coastal fish processors who fail to reduce both water wastage and effluent strength. On a brighter note this paper is concerned with the savings that can be made. It is based on findings of the detailed Seafish audits of seven white fish processors. The problem areas associated with excessive water use and high strength effluent production are highlighted and simple, often inexpensive solutions to reduce the associated costs are discussed. Although the audits were carried out in white fish factories, the problems and solutions identified are fundamental and can be applied to other sectors of the industry. The basic principles and effectiveness of both screening and dissolved air flotation (DAF) as end of pipe treatments for fish processing effluent are also discussed. A summary of current and future Seafish work in the area of waste ends the presentation.

2. Problem Areas and Simple Solutions

The main problem areas found during the factory audits were filleting, enrobing, defrosting, skinning, cleaning and poor drainage design.

2.1 Filleting

2.1.1 Water use

Traditional filleting benches often use a continually running hose pipe with an overflow system (Figure 1)

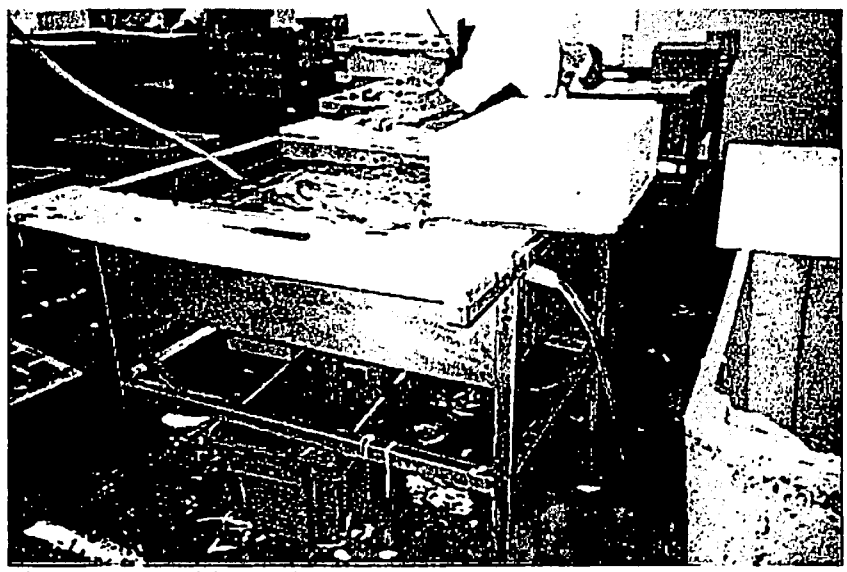

Figure 1 - Traditional filleting bench

Excessive water use was common, as a result of excessively high flow rates and water being left on when the benches were not in use. Solutions include changing working practices by filling the tub with water when fish have been added and changing the water only when required. Where continually running hose pipes are preferred, flow regulators can be fitted to control the maximum flow rate into the tub.

Some companies use 'dry' filleting systems. In these systems, the fish are pre-washed, filleters then use a water spray on the bench to lubricate the knife, wash the fillet and keep the cutting board/apron clean (Figure 2). Dry systems can use less water and can be considerably more hygienic than filleting using a tub. However, the high capital cost and potentially high water consumption of the fish washer must be considered.

Figure 2 - Dry filleting system

2.1.2 Effluent production

In many companies, the trimming waste either ends up soaking in the tub or finds its way onto the floor (Figure 3). Tubs are usually emptied into a basket to catch the trimmings, however the force of the water washes out small pieces of waste onto the floor.

Typically, much of this waste is washed into the drain, significantly increasing the effluent strength and hence the future Mogden calculated trade effluent charges. These problems could be prevented by using catch trays to collect the pieces of trimmed fish and by educating staff to keep waste off the floor. Alternatively, the filleting could be converted into a 'dry' system.

Figure 3 - Filleting waste

2.2 Enrobing

The waste generated by an enrobing process can produce very high strength effluent. Batter and breadcrumbs often build up under enrobing equipment as a result of poor conveyor alignment or a missing drip tray (Figure 4). The waste either runs or is brushed into the drain producing very high strength effluent. For example, the trade effluent charges currently associated with the disposal of pure batter is about £0.18/m^3. This is likely to increase to about £230/m^3 when Mogden charges are introduced. Solutions include checking the alignment of equipment to prevent leaks, using drip trays and not making up more batter than required.

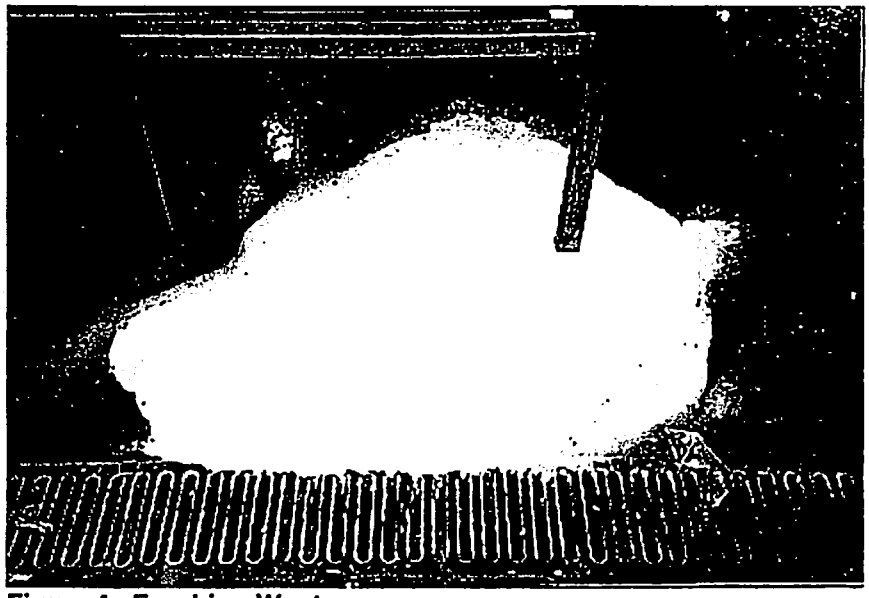

Figure 4 - Enrobing Waste

2.3 Defrosting

Spray, tub and stacked fish box defrosting systems commonly resulted in a significant amount of water being wasted and the fish failing to defrost.

With spray defrosting systems, the water sprays are typically left running overnight (approximately 12 hours). However, the fish can defrost within 3-4 hours, resulting in a significant amount of wasted water. When fish are defrosted in stacked bins or fish boxes filled with water, most systems have little or no water circulation and the tub/box design does not allow water to flow freely into the boxes below.

Water usage can be reduced by using simple process control systems to switch the water off when the fish have defrosted and by ensuring adequate circulation in tubs and boxes.

Purpose designed defrosting equipment may have a higher capital cost, but can significantly reduce water use and effluent production.

2.4 Skinning Machines

Many skinning machines used excessive amounts of water and most produced unnecessarily high strength effluent.

The water flow rates into Baader 51 skinning machines ranged from 8 l/min to 70 l/min. Whilst Baader recommend a flow rate of 25 l/min, many companies use these machines, at a flow rate of 12 l/min, apparently without problems. Also, water is often left on when the equipment is not in use. The flow rate into this type of skinning machine could be regulated to the required rate by using a flow regulator. Staff should be educated to turn the water off when the machine is not in use, alternatively an electric solenoid valve could be fitted.

High strength effluent is produced as the water runs down the waste chute and washes through the skins in the catch basket, resulting in small pieces of fish being washed out onto the floor. A separator screen should be used to direct water away from the box of skins.

2.5 Cleaning

Cleaning is an important area which can have a significant effect on the volume and strength of effluent produced.

2.5.1. Water Use

In many companies, a significant amount of water was wasted by chasing waste around the floor with either a power washer or an open hose pipe. Hose pipes were also left on when not in use. Solutions include using a squeegee for efficient floor cleaning and by fitting trigger nozzles onto hoses.

2.5.2 Effluent Production

Unfortunately in most factories, waste on the floor is brushed or squeegeed directly into the drain, which is seen as an easy and convenient waste disposal route (Figure 5). Covers are often lifted to make this task easier. Once waste is in the effluent it is very difficult and expensive to remove. Staff must be educated to shovel waste up and into bins rather than down the drain.

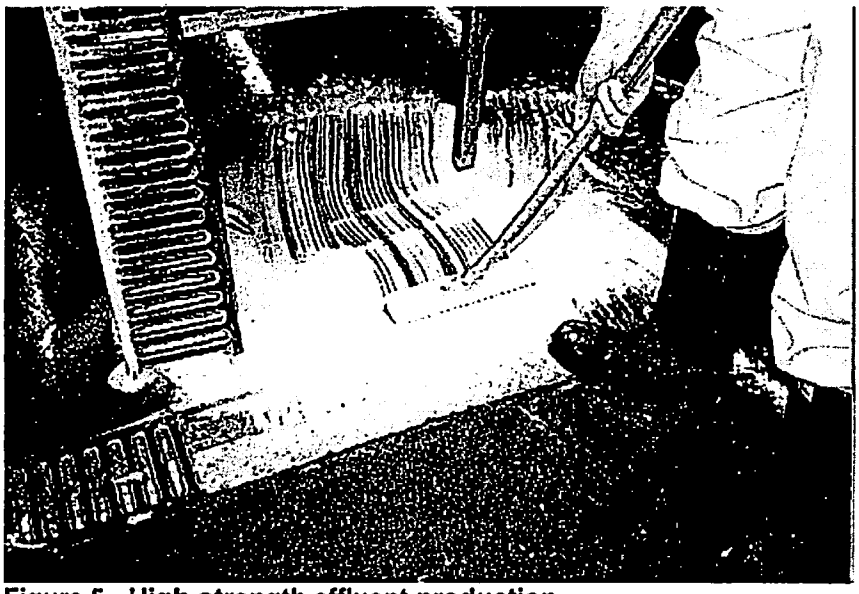

Figure 5 - High strength effluent production

2.6 Drain Covers

Most factories used large aperture slotted drain covers which allow very large solids to enter the drainage channel, significantly increasing the effluent strength Covers should be redesigned with smaller holes.

2.7 Catch Baskets

Most companies used catch baskets at the end of the factory drainage channels to remove solids from the effluent before it left the factory (Figure 6). Some companies had no provision for baskets, whilst other companies had them but failed to use them due to problems with blocking.

All catch baskets were poorly designed, often ill fitting , allowing solids to escape into the drain. The baskets also allowed all the effluent to wash through the trapped waste, washing out small pieces of fish, dramatically increasing the strength of the effluent. This problem was made much worse by infrequent cleaning. Catch baskets should be re-designed to prevent these problems and cleaned out at least once each day.

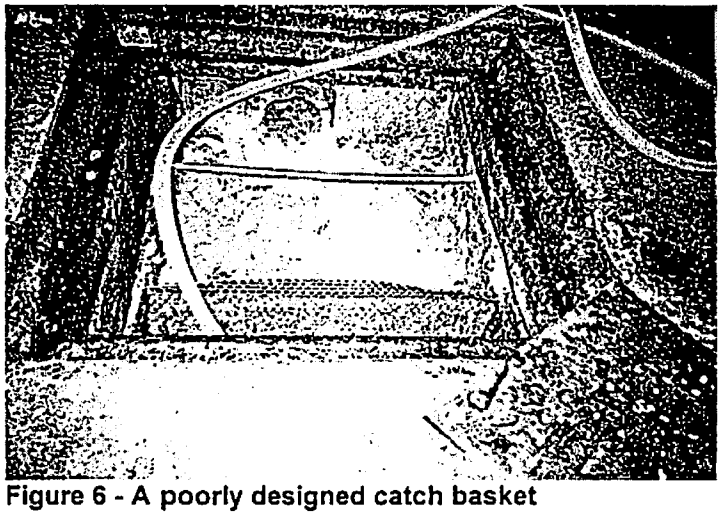

Figure 6 - A poorly designed catch basket

3. Summary of Waste Reduction

Coastal fish processors face dramatic increases in trade effluent disposal charges. To keep these charges to a minimum, companies must minimise water wastage and reduce effluent strength at source by keeping waste out of the drain. However, the good news is that this can be achieved at little or no cost, through staff management and simple equipment modifications.

By using small aperture catch baskets and establishing good practices, a Scottish fish processor recently managed to reduce effluent strength by about 95% which would correspond to a 76% reduction in Mogden trade effluent charges.

4. Practical End of Pipe Treatment

End of pipe treatment equipment can be used to further reduce the strength of the effluent leaving the factory. Carrying out waste minimisation first is essential, as once waste is in the effluent it is very difficult and expensive to remove, thus directly affecting type, size and cost of the end of pipe treatment required. For many companies it is likely that effective minimisation could eliminate the need for end of pipe treatment altogether.

Seafish have carried out trials with both screening and dissolved air flotation (DAF) systems to investigate their performance on fish processing effluent.

Screening trials were carried out with a rotary wedge wire screen (Figure 7). Wedge wire is a specialist screening material which has a unique shape to help prevent blocking. A 0.25 mm aperture screen reduced the BOD and SS of white fish and herring effluent by about 20 - 40%.

Dissolved air flotation (Figure 8) is a system which floats out the suspended material from screened effluent. Chemicals can be added to make the process more efficient. In trials with both pelagic and white fish (skinning machine effluent) effluent strength was reduced by 80-90%, resulting in a calculated Mogden charge reduction of approximately 80%.

However, DAF is only effective on effluents with a high proportion of suspended solids and has very high capital costs. Chemical dosing costs and sludge disposal costs must be also be considered.

Figure 7 - A typical rotary screen

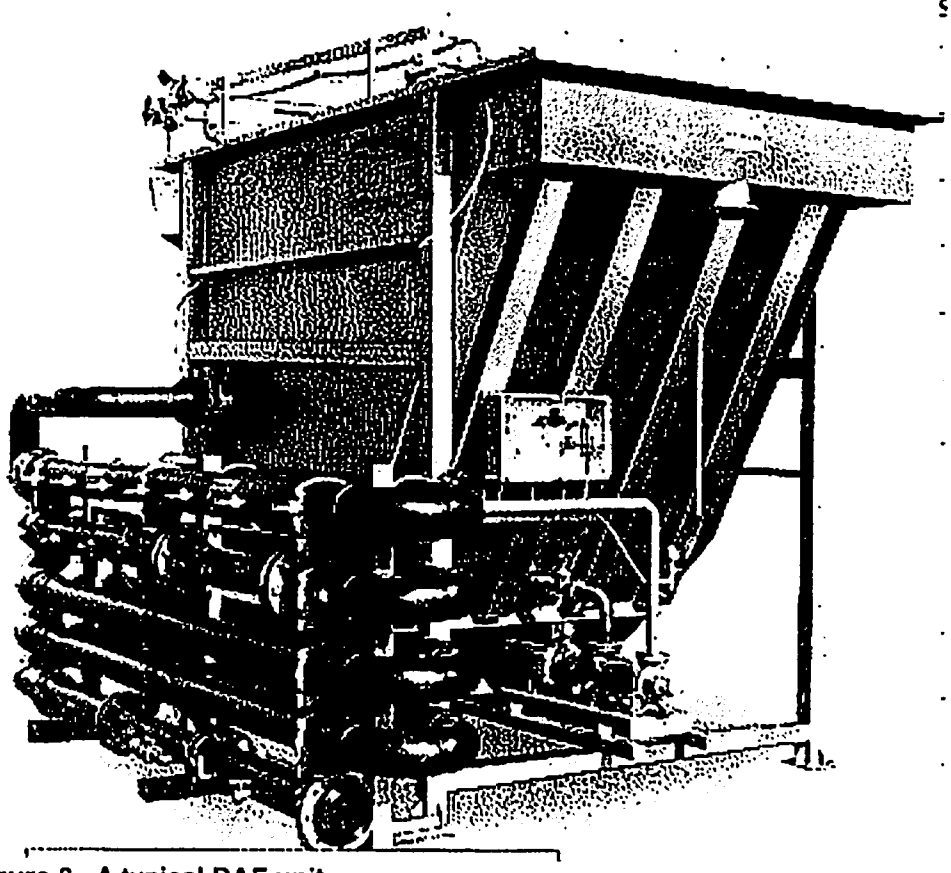

Figure 8 - A typical DAF unit

5. Current Work

Seafish are currently testing and developing simple equipment modifications to solve the water wastage and high strength effluent problems identified from the detailed company audits.

A traditional tub filleting bench is being modified to include water sprays and catch trays, to determine the benefits of using a 'dry' filleting type system and keeping waste out of the effluent.

Wedge wire waste separator chutes are being tested to prevent the water washing through the skins in the basket below skinning machines. This separation principle is also being used in the development of catch baskets, designed to remove very fine solids from the effluent without the effluent stream washing through the waste.

Drain covers are being designed and tested, made from both punch plate and wedge wire to develop a cover which will retain small pieces of effluent without blocking.

In addition, further detailed audits will be carried out in herring, mackerel and shellfish processing factories.

The results of the audits, waste minimisation equipment trials and end of pipe treatment trials will then be used to produce comprehensive Seafish guidance material.

Further information is available from
Seafish Technology
Sea Fish Industry Authority
St Andrews Dock
Hull
HU3 4QE

6. Useful Technical Reports

SR514 Water Usage and Effluent Production in Whitefish Processing - A Summary of Seven Water and Effluent Audits. 1998.

SR500 Trials to Determine the Effectiveness of Screening and Dissolved Air Flotation (DAF) for Treating Herring and White Fish Processing Effluent. 1996.

SR495 Conference Proceedings - One Man's Waste is Another's Raw Material. Waste Minimisation and By-Product Utilisation in the Fish Industry. 1997.

Paper 4
The Fish Processing Sector's Perspective of Water Costs - Business Implications

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The Fish Processing Sector's Perspective of Water Costs - Business Implications

Robert Milne, MBE, JP, Managing Director, Aberdeen Fish Curers and Merchants Association Ltd

I begin today by putting out a warning to the European Civil Servants, that if they continue to dream up new legislation they will become infamous for removing the fish processing sector from the map of Scotland.

Addressing a wider audience, I would remind you that less than a decade ago the European Union decided that it would introduce new legislation in relation to fish processing premises. They took from the shelf a meat document, stroked out the word 'meat' and replaced it with the word 'fish'. The UK Authorities acted early on this document and my members were forced to do much more than was necessary to maintain their premises at an acceptable standard. Of course, a large number of processors were unable to meet the costs of these requirements and opted out of the industry. We have been on a downward curve ever since.

Our bureaucrats, or rather Eurocrats, next decreed that we should have veterinary charges imposed on our sector. These have started as far as imports are concerned and next year we are expected to pay for fish inspection at the point of landing. The same fish will require to be inspected again at the point of processing and again my members will have to pay for this charge. It is unbelievable that fish, which is inedible long before it is unsafe, should be subjected to these two charges.

Much of the legislation imposed upon us so far, e.g. hygiene regulations, has cost the industry a lot of money for little benefit and I want some reassurance today that this is not more of the same.

Then we come to today's subject which for me is the killer blow - the Waste Water Directive. It is unacceptable for these massive increases to be placed on our sector. Firstly, we are in an area of high dispersal and I personally do not believe that fish livers etc being returned to where they came from will do any harm whatsoever in this part of the world.

Secondly, I do not believe that this legislation will be imposed Europe-wide. Can you imagine for one minute these monstrous treatment facilities, each costing £50 million plus, being built along the Mediterranean coast line. Of course not. Common sense dictates otherwise.

Thirdly, looking at the profits English water companies declared quite recently, I believe there is ample funding within the budgets without imposing such charges on industry. I would like some of their finance directors to look at profits/losses incurred by my members and compare them to the returns that these water companies have returned.

You have heard from Michaela something about the costs being proposed. It is impossible for our members to comply and although I accept that the problem can be alleviated to a certain extent, nothing can be done to remove the huge increases. I must emphasise to NOSWA today that this is real concern for our industry with far-reaching implications. I do not think that NOSWA would want to go down in history as being the organisation which delivered the killer punch on behalf of Europe, but I would be failing in my role today if I did not express serious concerns about the effects this will have on the membership. In my time with AFCAMA I have seen the membership decrease from 200 to 90 and I believe that if the charges are imposed on the scale presently being suggested, then the industry will disappear altogether.

Paper 5

The North of Scotland Water Authority's Response to the Urban Waste Water Treatment (Scotland) Regulations 1994 SI 2842

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The Urban Wastewater Treatment Directive (91/271/EEC) Impact on Trade Effluent Charges

Graham Low, North of Scotland Water Authority

1. Introduction

The North of Scotland Water Authority is the statutory body with responsibility for the provision of water and wastewater services in the north of Scotland. The Authority, which came into being in April 1996, is a public organisation accountable to the Secretary of State for Scotland. It inherited the previous responsibilities of the Water and Sewerage Departments of Grampian, Tayside & Highland Regional Councils and the related activities of Western Isles Council, Orkney Islands Council and Shetland Islands Council.

The two primary legislative instruments which apply to the Authority are the Water (Scotland) Act 1980 and the Sewerage (Scotland) Act 1968.

In the next few years, the quantity of wastewater which receives treatment will increase considerably as the Authority implements the requirements of the EC Urban Wastewater Treatment Directive (91/271/EEC). In addition to the requirements in the Directive to treat wastewater there is a further requirement to cease the disposal of sludge to sea by the end of 1998. Consistent with other Authorities throughout the UK, achieving compliance with the requirements and time scales set out in the Directive is presenting a considerable challenge to the Authority, both technically and financially.

2. Background

Many of the sewerage systems still in use today in the UK date back to Victorian times. Those who established such systems favoured the use of short outfalls to sea for disposing of sewage from coastal communities, partly because it was assumed that the sea killed off bacteria and would dilute sewage sufficiently to render it harmless.

That theory, to a large extent, has been accepted until recent times and the legacy of these earlier practices can be seen around our coastline. In 1990 a survey was conducted by the Water Research Centre which showed that almost 90% of the UK's outfalls discharged less than 100 metres beyond the low water mark and almost half of them discharged untreated effluents. In the Grampian area of the Authority almost 80% of the population is served by some 70 sea outfalls which discharge wastewater to sea, with screening and maceration being the only treatment provided.

In recent times increasing public concern about these practices has resulted in a number of new statutory initiatives which have had a significant bearing on sewage disposal practices. Furthermore, the three International Conferences on the protection of the North Sea were fundamental in influencing environmental politics in Europe and in the UK and resulted in the Urban Wastewater Treatment Directive which was approved by the Council of European Communities in May 1991. The basic thrust of the Directive is towards the provision of secondary treatment (biological treatment) for significant wastewater discharges. At communities such as Aberdeen, Peterhead and Fraserburgh these facilities must be provided by the end of Year 2000.

3. Private Finance Initiative (PFI)

In order to meet the requirements of the Directive a high level of capital investment will be required in a relatively short period of time. It is estimated that the North of Scotland Water Authority will have to invest in excess of £300M over the next six or seven years. For wider economic and fiscal reasons, Government policy is to restrict public sector borrowing and to attract private finance into the industry to help fund this large investment. The Private Finance Initiative is seen as the best way to achieve this within the time scales required.

The Private Finance Initiative works on the basis that an agreement is entered into for a specific period (say 25 or 30 years) between the Authority and a Concessionaire to provide a service to finance, design, build, and operate a facility such as a sewage treatment works. Normally the Concessionaire will be paid a monthly sum by the Authority based on the quantity of sewage and sludge treated which meets the specified standards. No capital payments are made by the Authority and the monthly payments are commenced only when the plant becomes operational, following a specified performance test. The Concessionaire is free to design the plant in an innovative way, provided basic criteria are met. Throughout the period the concessionaire provides all labour to operate the works and is responsible for all replacement of equipment during the period of the concession without any additional payment.

At the present time the North of Scotland Water Authority proposes to procure three major schemes as follows on a PFI basis:-

- Inverness/Fort William Wastewater Scheme
- Tay Wastewater Scheme
- Aberdeen Wastewater Scheme

The Authority's principal objectives for the above projects are as follows:-

1) To implement a concession for the projects in accordance with the guidelines and principles of Private Finance Initiative.

2) To demonstrate that value for money has been achieved

3) To achieve the water quality standards and consent conditions laid down by the Scottish Environment Protection Agency

4) To obtain a sustainable solution for the disposal of sewage sludge

5) To ensure that the schemes progress in accordance with the Directive's timescales.

4. Aberdeen Wastewater Scheme

Following pre-qualification, four consortia have been selected to tender for the scheme. It is expected that a concession agreement will be signed before mid 1999 and thereafter the design and construction of the scheme will proceed.

The Authority intends that the Aberdeen Wastewater scheme will include the requirements for wastewater treatment facilities at Aberdeen, Stonehaven, Peterhead and Fraserburgh. Brief details of each element of the scheme are as follows:-

(a) Aberdeen:

The majority of the city of Aberdeen and the outlying communities of Kingswells, Westhill, Kirkton of Skene, Newtonhill and Portlethen are served by the Nigg Headworks and Long Sea Outfall. The existing preliminary treatment facilities at that location comprise mechanically raked coarse screens followed by fine screening and grit removal. The Long Sea Outfall was commissioned in 1988 and consists of a 2.5 metre diameter insitu concrete lined tunnelled outfall and shaft. The outfall is approximately 2.5 kilometres long with ten diffusers each with four 200 millimetre diameter ports. It is proposed that the scheme will provide a combined wastewater treatment plant and sludge treatment centre on land immediately adjacent to the existing Head Works.

(b) Persley Wastewater Treatment Plant

The plant, which serves Bucksburn, Dyce and part of Bridge of Don, was commissioned in 1971 and provides primary and secondary treatment for flows up to 3 DWF (dry weather flow) using the pure oxygen activated sludge (UNOX). The authority intends that the Persley Wastewater Treatment Plant will be taken over and operated by the Concessionaire.

(c) Stonehaven

The town of Stonehaven, which is situated approximately 15 miles south of Aberdeen, is served by two sewerage systems serving the Cowie and Carron catchments. The Carron catchment drains via a predominately combined system to the Carron Headworks where the flow receives maceration and grit removal prior to discharge via a long sea outfall. The other catchment drains to the Cowie Wastewater Treatment Plant where flow receives primary settlement prior to discharge at low water mark via a short sea outfall.

The Authority currently plans to transfer by pumping the flows from Stonehaven to the proposed Nigg Wastewater Treatment Plant for treatment and disposal.

(d) Peterhead

The majority of Peterhead drains via a series of intermediate pumping stations which pump flows to the Burnhaven preliminary treatment works. The catchment to the south of Peterhead drains by gravity direct to the existing Burnhaven Works and the wastewater from the village of Boddam is pumped into this gravity system. The existing long sea outfall, which discharges into Sandford Bay, consists of a 780 mm diameter steel pipeline approximately 680 metres long.

Peterhead has developed primarily as a fishing community, but now also provides considerable support to the north sea oil industry. Based on the 1991 census figure, the current domestic population is estimated to be in the order of 21,000. Contributions from existing industry are considerable and very variable due to the pelagic (herring and mackerel) fish processing activities in the town.

Detailed planning permission has been granted for the construction of a wastewater treatment plant and sludge treatment centre immediately adjacent to the existing Headworks at Burnhaven. The population equivalent of this proposed plant is about 250,000 but daily loadings can vary significantly from this this figure. The seasonal nature and sheer size of the trade effluent loading in Peterhead is a major issue for the designers/operators of the new wastewater treatment plant.

(e) Fraserburgh

In a similar fashion to Peterhead, the town of Fraserburgh developed as a fishing community and fishing and its associated industries are still the major source of employment in the area. The town currently discharges untreated wastewater to sea through 12 short sea outfalls resulting in periodic fouling of the foreshore. A section of the Fraserburgh beach to

the south east of the town is a designated bathing water in accordance with the EC Bathing Water Directive.

The current design philosophy for the Fraserburgh Scheme is that the existing 12 discharges will be intercepted and pumped westwards to a new wastewater treatment plant and sludge treatment centre on a new site at Phingask. Based on 1991 census figures the current domestic population is estimated to be in the order of 13,500. Like the neighbouring town of Peterhead, Fraserburgh has a large fish processing industry, including pelagic fish processing, and therefore contributions from existing industry are likewise considerable and variable. Problems in establishing loading criteria for the new treatment plant at Fraserburgh therefore equally exist.

5. Trade Effluent and Charges

Consistent with other parts of the United Kingdom it is inevitable that the considerable cost of meeting the requirements of the Directive will result in increases in wastewater charges generally.

In regard to trade effluent control the Authority has a policy which will lead to all consents and agreements having maximum numerical values for relevant parameters. Consents will primarily be load based and will be implemented towards the end of this year. The Authority's Trade Effluent Charging Scheme is based on the "Polluter Pays" principle using the Mogden Formula. This has been accepted by the Confederation of British Industry as being fair, reflecting the actual cost of collection, conveyance, treatment and disposal of trade effluent. The formula is widely used throughout the UK.

The principle of charging for trade effluent on this basis is not new to trade effluent dischargers in the North East as Grampian Regional Council, the former sewerage authority, introduced Mogden based trade effluent charges in 1990. Until now however, the majority of discharges in coastal areas have been made direct to the sea via sea outfalls with little or no treatment provided. The advent of treatment facilities at these coastal communities, to meet the requirements of the Directive, will result in the full Mogden Formula being applied thereafter. Charges will then reflect the cost which that discharger imposes on the system both in terms of volume and pollutant strength.

Since the introduction of trade effluent charges the north east fishing industry has been well advised on an individual basis and through agencies such as AFCAMA of the likely financial implications of the EC Directive. Technical advice has also been given about ways to control waste at source and therefore reduce the charging impact. Last year, the Water Authority, in conjunction with AFCAMA and other agencies and specialist advisors, sought to establish a waste minimisation project targeted at the fish processing industry by both reducing the quantity of trade effluent discharges and

improving the quality, thus minimising the impact of Trade Effluent Charges. Regrettably, the plan to lodge an application for European funding to support the initiative failed and the project did not proceed. The Authority would be pleased to participate if a proposal is made to resurrect the project.

6. Summary

1. The North of Scotland Water Authority is duty bound to meet the requirements and timescales of the Directive and our sponsor (The Scottish Office) and environmental regulator (SEPA) expects us to deliver.

2. The Authority cannot fund the total programme of environmental improvements from conventional means and has turned to the Private Finance Initiative to deliver schemes in Inverness, Dundee and Aberdeen.

3. The Authority has a Trade Effluent Policy to effectively control trade effluent discharges. Charges will be based on the Mogden Formula and are likely to increase significantly post Year 2000.

4. There is a need for effective dialogue between industry (especially the fishing industry) and the Water Authority to develop a methodology for achieving the best practical environmental option (BPEO) for disposing of waste. The options are:-

    a) do nothing and face significant increases in charges. (We do not regard this as a feasible option.)
    b) reduce effluent strength and volume at source to reduce the impact of charges.
    c) disconnect from public sewerage and provide private facilities.

5. Time is short. The fish processing industry needs to become more alert and responsive to the need for measures at source to help mitigate the future increase in charges.

Paper 6

Control of Waste Water Discharges to Receiving Waters in Scotland

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Control of Waste Water Discharges to Receiving Waters in Scotland

Dr Graeme Rose, Scottish Environmental Protection Agency

Introduction

The Scottish Environment Protection Agency (SEPA) was established under the Environment Act 1995 and became fully operational on 1 April 1996. SEPA is responsible for the protection of the Scottish environment and is accountable to the Secretary of State for Scotland.

SEPA's principal aim is:

"to provide an efficient and integrated environment protection system for Scotland, which will both improve the environment and contribute to the government's goal of sustainable development."

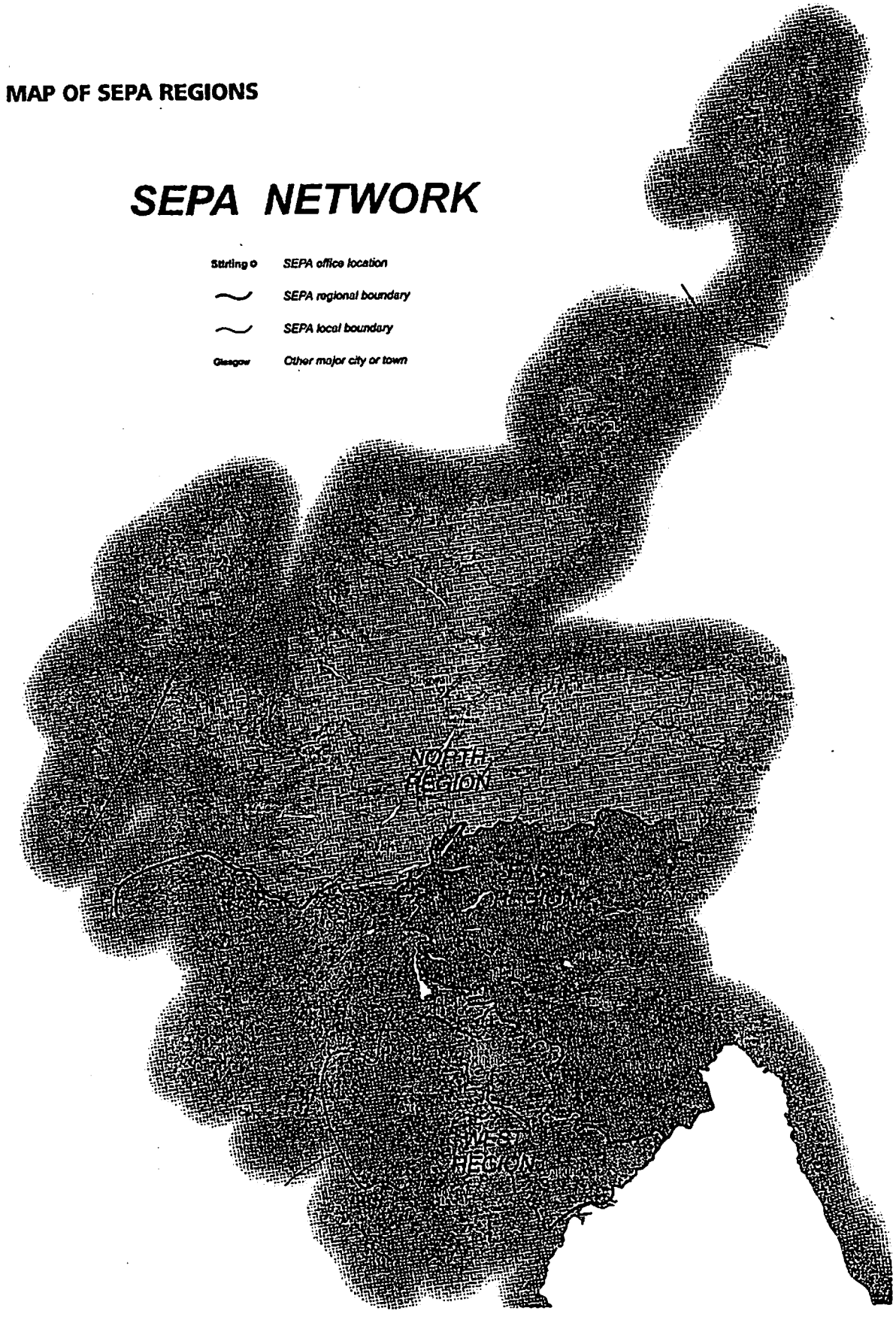
The Environment Act 1995 gave SEPA duties and powers inherited from its predecessor bodies which were:-

- Seven River Purification Boards and their counterparts in the three Islands Councils.
- Fifty-six District and Islands Councils in respect of their functions regarding air pollution control and waste regulation.
- Her Majesty's Industrial Pollution Inspectorate.

There are three regions as shown on the accompanying map, with a total of about 50,000 Km of rivers and lochs, 800 sq Km of estuaries and over 7,000 Km of coastal waters to protect. There are some 40,000 consents to discharge effluent to these waters.

SEPA has a budget of £29.3 million for 1998/99 and employs about 650 staff at 21 locations throughout Scotland.

MAP OF SEPA REGIONS



Duties and Functions

SEPA seeks to prevent, minimise or reduce pollution and aims to contribute to the steady improvement of the environment of Scotland at a pace that society can afford. The principal duties and functions are summarised below.

- Consenting of discharges to the water environment (surface, coastal and groundwaters);
- Conserving water resources as far as practicable and promoting the conservation and enhancement of the natural beauty and amenity of controlled waters;
- Providing flood warning systems, assessing the risk of flooding in any area as far as SEPA considers appropriate and advising planning authorities on flood risk based on such information as SEPA holds;
- Granting water abstraction licenses for irrigation where a control order is in force;
- Enforcing the Sludge (Use in Agriculture) Regulations 1989;
- Issuing authorisations to prevent, minimise or render harmless the release of substances into the environment from prescribed processes;
- Authorising the handling and disposal of radioactive materials and registering persons holding or using such materials;
- Licensing of waste management activities;
- Registering of waste carriers and brokers and regulating the transfrontier shipment of waste;
- Taking enforcement action against persons breaching licence conditions or illegally polluting the environment;
- Carrying out assessments of the general state of the environment (if required by the Secretary of State for Scotland);
- Keeping up-to-date on pollution control technology, with powers to undertake relevant research and development;
- A duty to have regard both to the desirability of conserving and enhancing the natural and man-made environment and to the social and economic needs of any area;
- A duty to take into account the likely costs and benefits of exercising its powers; and
- A duty to ensure compliance with the Producer Responsibility Regulations as directed by the Secretary of State for Scotland.

Control of Pollution Act (1974) - COPA (as amended)

COPA is the principal legislation with respect to SEPA's duties in the control of discharges to the aquatic environment. The original Act of 1974 has subsequently been amended by the Water Act 1989, Schedule 23 and the Environment Act 1975, Schedule 16.

It is an offence under COPA to cause or knowingly permit poisonous, noxious or polluting matter or any solid waste matter to enter controlled waters, a term which covers inland waters, groundwater, coastal waters and territorial waters out to three nautical miles. It is also an offence to cause or knowingly permit a discharge of trade or sewage effluent to surface waters (rivers, streams, lochs and the sea) unless a consent to make this discharge has been granted by SEPA. The consent document is therefore fundamental to the control of discharges under COPA.

Conviction for an offence under COPA is a serious matter and can lead to fines of up to £20,000 at Sheriff Court or unlimited fines at High court with the possibility of imposition of a prison sentence.

Consent Procedure

SEPA has a statutory duty to issue, monitor and enforce discharge consents and to maintain and improve water quality. A consent is essentially a contract between the discharges and SEPA which prescribes the effluent performance required to protect the environment.

An application for consent is made on a standard form available from SEPA. Guidance to the form provides advice on the information required by SEPA which includes:-

- Location, design and construction of treatment plant and outlets;
- Nature and composition of effluent;
- Volume and rate of discharge;
- Sampling facilities;
- Provision, maintenance and testing of meters including flow meters; and
- Provision of back-up facilities.

There is a four month determination period unless an extension is arranged with written agreement. Applications are advertised in a suitable local newspaper and the Edinburgh Gazette. It is a statutory requirement for SEPA to consult the Local Authority and Secretary of State on all consent applications. The Secretary of State has vested authority in this matter to the Scottish Office Agriculture, Environment and Fisheries Department. Where SEPA considers the discharge will have no appreciable impact on the receiving waters, then the advertising procedure can be dispensed with. This is, however, only for minor discharges, such as from single houses.

Representations must be made to SEPA within six weeks of the date of the notice in the Edinburgh Gazette. All such representations must be considered by SEPA and notice of the decision must be served on the person who made the representation. There follows a twenty-one day statutory period during which the Secretary of State can be requested to call in the application for determination.

Consent Determination

Consents are generally determined with respect to the carrying capacity of the receiving waters. SEPA will take account of the requirements of UK and EC legislation as well as its own policies. EC legislation takes the form of Directives which are subsequently enacted into Scottish law. For example, the Urban Waste Water Treatment Directive (91/271/EEC) is enacted by the Urban Waste Water Treatment (Scotland) Regulations 1994. The Bathing Water Directive (76/160/EEC) is enacted by the Bathing Waters (Classification) (Scotland) Regulations 1991.

The Urban Waste Water Treatment Regulations have important implications for qualifying discharges to controlled waters. The Regulations specify minimum standards of treatment for discharges of municipal wastewater and biodegradable industrial effluent and furthermore, improvement works must be completed by deadlines given in the Regulations. The cost of improvements required at sewage works will lead to higher costs for those who discharge to the foul sewer.

Direct discharges of biodegradable industrial waste to controlled waters are covered by regulation 8 which specifies that all such qualifying discharges on or after 31 December 2000 should be controlled by appropriate conditions included in a COPA consent. In this respect, qualifying discharges are those with population equivalent greater than 1,000 from industrial sectors listed in Schedule 5 which includes the fish processing sector.

Summary of Consent Procedures

- Discharger consults with SEPA;
- Application submitted with appropriate fee;
- Application advertised;
- Consent determined within four months unless:-
  - (i) extension agreed in writing
  - (ii) application called in by Secretary of State
- If consent is refused, discharger has right of appeal;
- If consent is granted, SEPA has a duty to review the consent but not within four years of issue unless with the written agreement of the discharger.

SEPA Charging Scheme

In accordance with the Environment Act 1995, SEPA recovers the costs of regulation from dischargers. Following a review of charging income, and in line with the Polluter Pays Principle, SEPA has a new charging scheme approved by the Secretary of State in January 1998. The scheme ensures that the relevant costs of regulatory activity are fully recovered through charges.

The annual charge is made up of three components; the volume of the discharge, the contents of the discharge and the nature of the water that receives the discharge. The volume and contents are split into bands with associated numeric factors reflecting the quantity of the discharge and its impact on the environment. There are also numeric factors for each type of receiving water.

For a particular discharge, the appropriate numeric factors are multiplied together with the unit annual charge to give the full annual charge for the discharge. Further details are given in the Scheme of Annual Charges in Respect of Discharges to Controlled Waters, 1998-2001, which is available from SEPA.

Implications of Seeking Consent for Direct Discharge

The option of treatment provision and direct discharge to coastal waters is not something that should be considered lightly.

The discharger will need to undertake costly field work and modelling studies to provide information to support the consent application and to demonstrate that the discharge can safely be accommodated by the receiving environment.

Typically this will involve hydrographic surveys to provide information on current speeds and dilution characteristics, supplemented by modelling work to investigate the impact of different scenarios of tidal state and wind speed. Bathymetric surveys will be required to study sea-bed profile with a view to efficient costing of laying pipelines to the optimised outfall position and to investigate the seabed habitat around the point of discharge.

There will need to be effluent characterisation in terms of flow and composition and also an assessment of receiving water quality and uses.

Assuming that a consent can be granted, there will be capital costs in providing treatment to meet standards imposed by SEPA as well as costs of laying pipelines to a discharge point which will allow adequate dilution to be provided. It is clear that some processors will be better placed than others in terms of the costs associated with laying pipelines both in terms of proximity to the coastal waters and the capacity of the coastal waters to receive effluent.

The treatment plant will have associated running costs, e.g. power supply, waste disposal, operating personnel and maintenance costs to ensure that consent conditions are met at all times. Staff would need to be competent and properly trained in the operation of the plant as

failure to comply with consent conditions may have serious consequences as referred to earlier.

Waste Minimisation

Waste minimisation and re-cycling are actively being promoted within industry. Many companies now recognise that they can substantially reduce their costs by adopting a systematic approach to minimising their waste. Increased effluent disposal charges will undoubtedly be a driver for reduction in both water usage and the strength of effluent produced. There are examples in the fish processing industry in England where better house-keeping, more efficient handling practices and water recycling and re-use where practicable, have dramatically reduced charges.

Research is progressing within the industry and help for dischargers is available. SEPA would urge fish processors to seek advice on waste minimisation procedures relevant to their industry with a view to implementing them as soon as possible.

Paper 7
Control of Sea Outfall Construction

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Aberdeen

Control of Sea Outfall

Derek Saward, Environmental Protection Section, Fisheries Research Services, Marine Laboratory, Aberdeen

The Major Issues

The major issues facing fish processors are summarised below:

1. Implications of Urban Waste Water Treatment Directive.

2. Compliance with domestic controls on effluent discharges.

3. Reducing water use and effluent production.

4. Identification of common problems and solutions.

Options and Costs

The available options, and likely cost implications, are summarised below:

1. No change in effluent quantity and quality discharged to the public sewerage system:

   Likely to be extremely expensive, as trade effluent charges will be calculated using the Mogden formula, which includes multipliers derived from the BOD/COD and suspended solid load of the effluent.

2. Effluent minimisation (reduced water use), and modest improvements in effluent quality (containment of waste streams such as offal and fish coatings, and strict control of wastes entering sewerage system):

   Significant savings in trade effluent charges for a modest investment. Alternative disposal options must be found and costed for solid wastes.

3. Effluent minimisation (reduced water use), and effluent treatment at site of production (solids removal, Dissolved Air Flotation, biological treatment etc):

   Significant capital investment (treatment facilities) and running costs (staff, operational and solid waste disposal costs), which can be reduced if treatment facilities are shared, offset by a very significant reduction in trade effluent charges.

4. Effluent minimisation (reduced water use), and appropriate level of effluent treatment (to meet regulatory requirements) prior to discharge via dedicated sea outfall.

Moderate capital investment (partial treatment facilities and sea outfall) and running costs (staff, operational and solid waste disposal costs), which can be reduced if treatment and outfall facilities are shared. No trade effluent charges.

Discharges via a Dedicated Sea Outfall

Although the construction and use of a dedicated sea outfall may appear to be an attractive option, it is important to consider the logistic and legislative implications:

1. Logistical considerations

A dedicated sea outfall is unlikely to be a feasible option for premises located some distance from the sea; and there may be opposition if premises are located within urban areas that are already served by an existing public sewerage system and sea outfall(s).

Nevertheless, a dedicated sea outfall may be the most appropriate option for some premises, particularly those located in more remote areas. Premises in areas such as the Shetland Isles, Orkney Isles, Western Isles and the Highlands could, therefore, become more competitive.

2. Statutory considerations

a. Construction of Sea Outfalls

The construction of a sea outfall may require:

Approval under relevant planning legislation (obtained from the local authority for the area in which the outfall is located).

A licence under the Food and Environment Protection Act (FEPA) 1985, Part II Deposits in the Sea, as amended by the Environmental Protection Act 1990 (obtained from the designated licensing authority).

A consent under the Coast Protection Act 1949, as amended by the Merchant Shipping Act 1988 (obtained from the Department of the Environment, Transport and the Regions, Ports Division).

A foreshore lease (obtained from the Crown Estate Office).

b. Operation of Sea Outfalls

The operation of a sea outfall will require a discharge consent under the Control of Pollution Act 1974, Part II Pollution of Water, as amended by the Water Act 1989 and the Environment Act 1995 (obtained from the Scottish Environment Protection Agency).

The Food and Environment Protection Act (FEPA) 1985 (as amended by the Environmental Protection Act 1990)

The Food and Environment Protection Act (FEPA), Part II Deposits in the Sea, replaced the Dumping at Sea Act 1974.

A licence is required under FEPA Part II for the deposit of any substance or article within United Kingdom waters, whether the deposit is made in the sea or under the sea bed.

For the purpose of FEPA Part II, the sea is defined as any area submerged at Mean High Water Springs (MHWS), and includes, so far as the tide flows at Mean High Water Springs, any estuary or arm of the sea and the waters of any channel, creek, bay or river.

A licence is required under FEPA Part II for deposits made for the purpose of marine construction works, in addition to deposits made for the purpose of sea disposal. A licence is therefore required for the construction of any sea outfall that extends below MHWS.

1. **FEPA Part II licensing authorities**

a. Scottish Waters

The licensing authority, on behalf of the Secretary of State is:

Fisheries Research Services, Marine Laboratory, Aberdeen.

Fisheries Research Services is an Executive Agency of the Scottish Office, and the Scottish Office Agriculture, Environment and Fisheries Department (SOAEFD) retains responsibility for FEPA Part II policy.

b. English and Welsh Waters

The licensing authority is:

Ministry of Agriculture, Fisheries and Food, Nobel House, London.

c. Northern Ireland Waters

The licensing authority, on behalf of the Secretary of State, is:

Department of the Environment for Northern Ireland, Environment and Heritage Service, Calvert House, Belfast.

2. FEPA Part II licence applications

Application forms and relevant guidance can be obtained from the licensing authority.

It is recommended that proposals are discussed with other relevant authorities prior to submission of the FEPA Part II application. For applications relating to Scottish waters, the most important authorities are:

Local authority for area in which the outfall is located.
Department of the Environment, Transport and the Regions (DETR), Ports Division, Great Minster House, 76 Marsham Street, London SW1P 4DR.

Crown Estate Office, 10 Charlotte Square, Edinburgh EH2 4DR.

Local office of the Scottish Environment Protection Agency (SEPA).

Local office of Scottish Natural Heritage (SNH).

Application forms should normally be submitted to the licensing authority at least two months before the licence is required. In the case of applications relating to the construction of comparatively modest outfalls in Scottish waters, it is usually possible to issue a licence within approximately five to six weeks of the date of receipt of the application.

Application forms must be accompanied by the licence fee. For applications relating to Scottish waters, there are three categories of licence fee:

For projects where the works below MHWS will cost less than £3,135, the licence fee is £105.

For projects where the works below MHWS will cost between £3,135 and £26,125, the licence fee is £420.

For projects where the works below MHWS will cost more than £26,125, the licence fee is £1,045.

3. Completion of FEPA Part II licence applications

Application forms must contain, or be accompanied by, the following information:

a. Contact Details

For the applicant, agent (if any), contractor(s) and proposed licensee.

b. Requested Period of Licence Validity

Licences are normally issued for one year from the anticipated date of commencement of the works, but longer periods of validity can be agreed in exceptional circumstances.

c. Geographical Location of the Proposed Works

Latitude and longitude coordinates, to two decimal places of minutes, accompanied by a chart extract or plan identifying the proposed location.

d. Description and Quantity Estimates for all Permanent Deposits below MHWS

For example, 100 metres of 15 centimetre diameter high density polyethylene pipe, 20 cubic metre of concrete etc.

e. Description and Quantity Estimates for any Temporary Deposits below MHWS

For example, temporary shuttering or excavated seabed materials that are stockpiled prior to re-use to backfill an outfall trench.

f. Method Statement

A description of how the works will be undertaken.

g. Details of any Relevant Studies

The licensing authority is primarily interested in studies undertaken to determine the potential effect of the proposed construction works. However, it is also useful to provide details of any studies undertaken to determine the potential effect of the proposed discharge.

4. FEPA Part II consultation

There is no statutory obligation to seek the views of external consultees. Nevertheless, all applications are circulated for comment. The bodies normally consulted are:

a. Scottish Fisheries Protection Agency, Sea Fisheries Inspectorate

The local Fishery Offices of the Sea Fisheries Inspectorate are best placed to comment on possible interference with fishing operations.

b. Scottish Office Inspector of Salmon and Freshwater Fisheries

If the Inspector of Salmon and Freshwater Fisheries considers it desirable, consultation is extended to the local District Salmon Fisheries Board.

c. DETR Ports Division

Consent for the construction of the outfall may be required under the Coast Protection Act. (The Marine Laboratory is consulted on applications for consent under the Coast Protection Act).

d. Crown Estate Office

Approval from the landowner may be required to construct the outfall across the foreshore. In most cases (particularly on the Scottish mainland), ownership of the foreshore is vested with the Crown Estate Office.

e. SEPA

Consent for the proposed discharge will be required under the Control of Pollution Act, and conditions attached to the discharge consent can affect the design of the outfall. (The Marine Laboratory is consulted on applications for consent under the Control of Pollution Act).

f. SNH

Separate approval may be required from SNH, if the outfall is located within an area that has a designated conservation status, for example a Site of Special Scientific Interest (SSSI).

g. Relevant Port, Harbour or Planning Authorities

In most cases, separate approval will be required from the port or harbour authority if the construction works are within a designated port or harbour area. If there are concerns in relation to works above MHWS, applications are also referred to the local Planning Authority.

5. FEPA Part II licence determination

All applications are circulated within the Marine Laboratory for comment. This will usually involve consulting staff in the Fish and Shellfish Resources Team; the Fish and Shellfish Cultivation Team (fish and shellfish farms); and the Hydrography Section.

A summary assessment is prepared, taking account of the views of both Marine Laboratory and external consultees. The application is then determined.

a. Factors Taken into Consideration

Protection of the marine environment; the living resources that it supports; and human health.

Prevention of interference with other uses of the sea (including navigation and amenity considerations).

Any other matters which the licensing authority considers to be relevant (including aesthetic considerations).

b. Factors Not Taken into Consideration

Nature or perceived impact of deposits, ie proposed works, above MHWS. Any concern in relation to works above that tidal level will be referred to the relevant planning authority.

Proposed use of the outfall, ie nature and perceived impact of the proposed discharge. Any concern in relation to the nature of the proposed discharge, or the dilution and dispersion characteristics of the proposed outfall, will be referred to SEPA as controlling authority for the Control of Pollution Act.

6. **FEPA Part II licence issue**

a. The Licence Document

The licence document will confirm the Secretary of State's approval.

b. Part 1 of the Schedule to the Licence

Part 1 of the schedule to the licence will confirm:

The location of the permitted works.
The nature of the permitted works.

The nature and quantities of all permitted deposits (temporary and permanent) below MHWS.

c. Part 2 of the Schedule to the Licence

Part 2 of the schedule to the licence will detail the conditions attached to the licence. Typical licence conditions could include:

Restrictions, or prohibitions, on the use of toxic, persistent or bioaccumulable materials.

Total removal of any debris or waste materials arising during the course of the works.

Total removal of any temporary deposits, such as shuttering or excess stockpiled backfill materials.

Provision of a licence return confirming the nature and quantity of all permanent deposits remaining on the sea bed upon completion of the works.

Provision of a licence return confirming that any temporary deposits have been removed from the sea bed.

Provision of survey data, to confirm the precise location of the completed works; the amended seabed bathymetry in the vicinity of the works; or the total removal of any temporary deposits.

7. FEPA Part II licence variations and appeals

a. The Licensing Authority

The licensing authority can vary or revoke any licence:

If it appears that there has been a breach of any of the licence provisions.

If there is a change in the conditions that would affect the original assessment.

If increased scientific knowledge alters the original assessment.

For any other reason that appears to be relevant to the licensing authority.

Licensing authority variations and revocation are comparatively rare.

b. The Licensee

The licensee may request a variation of the licence, to amend any of the details included in the licence document or the schedule to the licence.

Licensee variations are comparatively common, and minor licence revisions (for example authorising an extension of the period of validity or a trivial change in the nature or quantity of a deposit) can usually be issued immediately. Major licence revisions (for example authorising the relocation of the outfall or to take account of a new method of construction) will usually require a further round of consultation.

The licensee can appeal against any of the provisions included in a licence, or a licence variation; and can also appeal against licence revocation.

Licensee appeals are extremely rare, and a mutually satisfactory outcome is sought wherever possible.

8. FEPA Part II exemptions

Certain deposits, or categories of work, may qualify for exemption from the requirement to obtain a FEPA Part II licence, or may be regarded as too trivial to warrant the issue of a licence.

For example, maintenance works on existing sea outfalls are specifically exempted from the requirement to obtain a licence, under Section 20 of the Schedule to the Deposits in the Sea (Exemptions) Order 1985; and minor works, such as the installation of a tidal flap valve on a outfall installed through a sea wall, are usually regarded as trivial, and the licensing authority will often advise the applicant that the authority is prepared to exempt the deposits from the requirement to obtain a licence.

Other works that might appear to qualify for exemption, for example maintenance works that involve alteration or extension of the outfall, will usually require to be the subject of a licence.

It is therefore recommended that potential applicants and licensees should contact the licensing authority prior to any development to confirm the licensing position, and that developers should always consult the licensing authority prior to undertaking any works below MHWS.

Unrelated to the issue of sea outfall construction, it is interesting to note that deposits (by way of return to sea) of fish or shellfish parts derived during the course of both fishing and fish processing operations at sea are exempted from the requirement to obtain a FEPA Part II licence, under Section 8 of Deposits in the Sea (Exemptions) Order. The current interest in landing and processing whole round-fish therefore creates a waste disposal problem that could be eliminated if the fish were gutted at sea; and Klondyking operations will not be subject to the restrictive and expensive controls faced by onshore processors. It is also interesting to note that the sea disposal of uncontaminated fish and shellfish offal can be licensed under FEPA Part II, providing it can be demonstrated to be the Best Practicable Environmental Option. It is therefore incorrect to assume that legislation seeks to prohibit the return of offal to the sea. It is simply a question of identifying the most appropriate and cost-effective disposal route to effect such a return.

Chairman's Summary, Questions and Open Discussion

Chairman's Summary

The Chairman gave a brief summary of the content of each presentation, then opened the conference to discussion. He indicated that the questions of whether there is any point in resisting the Directive or of seeking derogations should be considered by companies and their representative organisations outside this conference.

He identified four main areas:

1. What might the charges be, and to what extent would the users have to pay?

2. Should the fish processing industry in any case be reducing its use of water, and addressing reduction in the volume/strength of effluent? What technical help could they obtain to achieve this?

3. How can the industry best quantify its requirements, and discuss these with the Water Authority?

4. How should companies go about quantifying the costs and benefits of creating their own outfall(s), versus discharge to the sewer system?

Questions and Open Discussion

(Q: Wesley Denton, Seafish)
Who pays? The issue of timescale is important. The European Court of Auditors reports that most Northern European countries are playing by the book, while Mediterranean countries are lagging behind. Cost is a real issue in all Member States, so there is a general trend to time slippage. We know that full cost recovery by the polluters will be eventually enforced, but the time issue is crucial. We must have time to get the figures right, ensuring that the correct effluent and discharge facilities are put in place. Is it possible to ask for more time?

(A: Graham Low, NOSWA)
Meeting the time requirement is difficult, the Scottish Office/SEPA expect compliance by the due date, which presents a technical challenge. It is the intention of NOSWA to meet the deadline. Further time would be welcome, but this is a political issue.

(Q: A.Charles)
Has derogation been requested?

(A: Graham Low, NOSWA)
Yes, an application is under consideration in Europe. If this were approved, then for a period of time primary treatment only would need to be supplied. Derogation is reviewed on a 4-yearly basis. Derogation has only been applied for by NOSWA in the case of Aberdeen

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(Q: M. Croan, Croan Seafoods Ltd)
Would derogation only cover secondary treatment? Why does application for derogation not include Peterhead?

(A: Graham Low, NOSWA)
Yes, primary treatment would still have to be implemented. Because Peterhead would not be considered for derogation, since discharge into local water conditions is not likely to be approved.

(Q: Alasdair Fairbairn, Seafish)
Why the difference between Aberdeen and Peterhead?

(Q: A. Buchan, Alexander Buchan Ltd)
If derogation is approved for Aberdeen, how will this affect the Modgen charging?

(A: Graham Low, NOSWA)
The environmental situation at Peterhead dictates the treatment requirements.
Mogden charging builds in the cost of providing the facility.

(Q: C. Anderson, Fresh Catch Ltd)
What are the conditions that make Peterhead deemed unsuitable for derogation?
Should there not be more consultation with industry?

(A: Graham Low, NOSWA)
Aberdeen has a long outfall into deep water. At Peterhead, tidal surveys, and current metering demonstrates the impact of the discharge into the bay. Full treatment is deemed necessary. Extending the outfall itself is not necessarily a cost-effective solution. The Water Authority has taken the decision that full treatment should be provided.
Yes, there should be more consultation. That is what we are doing now.

(Q: W.Sharkey, McLaughlin Partners)
Are we an area of High Natural Dispersal (HND)?
If we are an area of HND, why are we going for full treatment?

(A: Graeme Rose, SEPA)
Yes, approved first in 1994, reviewed in 1997, and then redesignated.
In an area of HND, the discharger must demonstrate that there is no benefit from additional treatment. This has been done for Aberdeen.

(Q: W.Sharkey, McLaughlin Partners)
Rather than carry out studies and monitoring, we are going ahead with treatment and the PFI tenders. (Aside to R Milne - 'why put fish waste into the treatment at all - call it food effluent and discharge it straight to sea'). Why is it cheaper to put in plant than to investigate properly?

(A: Graham Low, NOSWA)
Taking into account the environmental situation at Peterhead and Fraserburgh, NOSWA has taken the decision to provide treatment facilities.

(Comment - Derek Saward, Marine Lab)
Derogation is unlikely to be approved

(Q: A.Charles)
Can we discharge fish waste effluent?

(A: Derek Saward, Marine Lab)
Technically yes, but not through a pipeline. It must be dumped at sea.

(Comment: R.J.Soetens, Velterop)
M.Soetens described to the conference the methods being implemented successfully by his company in the Netherlands. The Chairman advised those interested to contact M.Soetens individually - leaflets available after the conference.

(Q: Craig Anderson, Moray Council)
Though perhaps we are about 3-4 years behind where we should be in planning, we are now moving forward. We should be sure that derogation is obtained, because there is no chance that we can comply by the deadline. We should campaign to ensure that derogation is as long and as comprehensive as possible. We should not rush into large-scale investment without a greater understanding as a country, of how we will be affected by these investments. What options are being investigated?

(A: Graham Low, NOSWA)
NOSWA has not taken decisions lightly, a great deal of work has been done in previous years. However, the regulations must be met, and we are doing what we believe to be right. PFI introduces new ideas for solving the problems, but there are options to be presented by the PFIs to demonstrate value for money.

(Q: Alasdair Fairbairn, Seafish)
Fish processing waste is an important proportion of industry effluent. Are you not taking a risk that unless industry is consulted, some may opt out of discharge to the sewer system, leaving you with overcapacity and the inability to recover costs?

(A: Graham Low, NOSWA)
Yes, this is the difficulty we face. We don't want to overdesign the plant. NOSWA has sought consultation before, but only now has there been a response from industry, now it is law. We must get it right for those connected to the public system. We must sit down and talk with you, and continue to sample current loading. We must also consider the impact of the pelagic sector - let's talk now.

(Q: M. Croan, Croan Seafoods Ltd)
Northern European countries are being the "good guys" in response to the Directive, but if the Mediterranean nations opt out, this is galling for Peterhead. However, it is even more galling to see that Aberdeen and not Peterhead may obtain derogation.

(A: M. Soetens, Velterop)
The Netherlands is already well ahead in planning, and should be able to meet the deadline. Companies are trying to put procedures in place within their companies to offset the cost.

(Q: D.Milne)
The PFI in Edinburgh applied for derogation but did not get it. What are the consequences of not complying?

(A: Graeme Rose, SEPA)
By 2001? I'm not sure.

(Comment: Craig Anderson, Moray Council)
We should at least try for derogation. Can we have an assurance that the process will be undertaken to investigate the whole equation of options - loans/grants, etc - we must follow these through.

(A: Derek Saward, Marine Lab)
The Edinburgh situation is slightly different. Preliminary investigations are on the issue of sludge dumping. In the meantime, sludge will be trucked to England while the plant is being built.

(A: Graham Low, NOSWA)
What more can I say? NOSWA has tried to consult with industry in planning to provide a plant that meets the need. Perhaps we could consider pre-treatment so that fish waste is not mixed with general waste discharged into the system.

(Comment: Craig Anderson, Moray Council)
I have suggested that a grant-aid scheme, partly funded by NOSWA, matched by Scottish Enterprise, might be put in place, for an independent study for primary/secondary treatment, and to ascertain the costs and how these might be offset by the grant aid.

(Q: J.Sutherland)
We had samples taken twice, but have had no feedback. We have been down the road of European legislation before. All NOSWA wants from this body is a figure of how much effluent requires to be treated. We can treat our effluent at any time, and we pay for our existing effluent already. If the new charges are for the new service, what do we get for our rates now? Who was paying before the new effluent charge?

(A: Graham Low, NOSWA)
NOSWA collects effluent via the sewer system and the outfall. It is a public body and provides a public service. If new services are put in place, these will be charged appropriately.

(Q: G. Pacitti, Pacitti Foods Ltd)
I am alarmed at the scary charges spoken about today. I don't know where the industry will find the money to pay. Seafish should pick up the baton on behalf of the industry.

(A: Graham Low, NOSWA)
We have given information before, e.g. on the impact of the Modgen formula. For example, leaflets were sent to all companies who had consents (c5000) asking for comments, about 18 months ago. Less than 100 replied. It appears that we have not done enough.

(Q: Alasdair Fairbairn, Seafish)
Seafish have publicised this situation to attract attention to the problem. Like it or not, it is likely to happen. Seafish's job is not lobbying -you have your own organisations to do that. What should the industry be doing? Companies must investigate other methods for reducing their effluent charges and Seafish is issuing a technical report, pointing to a range of methods which could be applied in factories.

(Comment: C.Simpson, John Richards & Sons)
But this is not an option - 300% increases. I repeat, this is not an option. We asked for a seat on the NOSWA board, but were refused.

(A: Richard Watson, Seafish)
The examples given in Michaela's presentation were real, but, none the less, included an extreme example.

(Q: R.Cappell, Nautilus Consultants)
In view of the short time scale, what is the next step regarding the dialogue with NOSWA and Seafish?

(A: Alasdair Fairbairn, Seafish)
We need some structure. NOSWA has carried out some consultation, but this has not produced the required impact. There are 2 things that can be done. First, firms (as a minimum) should look at their current practices, and secondly, should combine to look at technical options with Seafish. However, costs will be different for each business. The calculation of costs and the most appropriate solutions will lie with the management of each company.

It seems to be the feeling of the meeting that companies are resistant to flushing effluent at such high cost, and that many will consider and implement other options, which could leave NOSWA with over capacity.

(Q: R.Cappell, Nautilus Consultants)
What is being done to prevent overlap of effort?

(A: Alasdair Fairbairn, Seafish)
Ultimately the answer lies with each company.

(Comment: Robert Allen, Seafish)
Seafish has been using the audit as a learning experience, to produce guidance materials for industry - so that companies can self-audit and self-remediate. This is their own responsibility.

(A: Richard Watson, Seafish)
The report (SR514) is available for use by any company.

(Q: D.Scott, Abacus Frozen Foods Ltd)
NOSWA used to provide waste surveys. Is this still available free, as it is in England, as Michaela suggested?

(A: Michaela Archer, Seafish)
It is not simply free in England. Some TECs have provided funding, and in the illustration, also Seafish. In Scotland this help might come from the LECs.

(Q: D.Scott, Abacus Frozen Foods Ltd)
We have a DAF unit. How can we best conduct an audit to ensure best use of treatment facilities?

(A: Michaela Archer, Seafish)
The companies themselves are best placed to solve their own problems, as they are close to them. They can identify problems and solutions, with the help of some guidance.

(Comment: Craig Anderson, Moray Council)
Any company can approach the Local Authority or local Enterprise Company for a 50% funding grant to audit. Moray Council certainly supports this.

(Comment: Paul Johnston, Aberdeenshire Council)
There seem to be 2 issues for processors: individual action, and collective action. Firstly, there needs to be more detailed information on the likely cost, and on how to reduce costs by internal practices. Secondly, there should be collective action via trade associations, e.g. AFCAMA. The (former) GRC and NOSWA action was not successful enough. Now NOSWA is taking action on capital expenditure without proper consultation, which is a political issue. By the end of this meeting, please let your organisation know your position on this.

(Comment: Robert Milne, AFCAMA)
AFCAMA has lobbied for the last 4 years, and has provided lots of information via the Press, TV, etc - which has all carried warnings regarding the probable charges. AFCAMA has been very active in this lobbying, and it's position is "can't pay, won't pay" - to the bitter end.

(Q: C. Simpson, John Richards & Sons)
Is "the polluter pays" part of European law?

(A: Graham Low, NOSWA)
Yes, it is.

(Comment: Robert Milne, AFCAMA)
I don't accept this at all. We've seen this before, where Britain complied and other countries did not. On this issue the Federation's principle is firm. We will not pay.

(Comment: Wesley Denton, Seafish)
We are signed up to the European Treaty. But the question is, how fast must we comply? That is where the politicians may have room to manoeuvre.

(Further comment from the floor:)
Different countries may interpret "polluter pays" in different ways - is it everyone, i.e. all users, and therefore spread across the population.

Summing Up (Alasdair Fairbairn, Seafish)

Action is required, and we should consider 3 points. First, Mr Milne has told us that collective action has been going on through AFCAMA and companies should try for derogation directly and through their representative organisations. Second, the directive will be implemented - but we need to consider "when". Third, there are technical and financial options for each company to consider.

My advice would be summed up - "The Lord helps those who help themselves" - the industry case is stronger if it puts its own house in order. Seafish will help with this. Let's keep up the collective pressure, but each business should keep its own cost to a minimum and address its own water usage and waste issues.

Delegate List

Adron, R.	Grampian Enterprise
Anderson, C.	Fresh Catch Ltd.
Bain, E.G.	A. Ramsy/Magnus Gray Ltd.
Beaton, J.	Macduff Shellfish (Scotland) Ltd.
Benthrone, A.	Denolm Seafoods
Bruce, M.	Euromak Ltd.
Buchan, A.	Alexander Buchan Ltd.
Cappell, R.	Nautilus Consultants
Chree, A.	United Fish Products
Ciberio, R.M.	Joseph Robertson
Clark, A.	North of Scotland Water Authority
Close, B.	Connors Seafood Ltd.
Close, B.	Enviro-Marine Ltd.
Couper, D.	Couper Seafoods
Croan, M.J.	Croan Seafoods Ltd.
Crockford, A.R.	Trawl-pac/Scottish Fish Merchants' Federation
Crockford, V.	Fresh Catch Ltd.
Daily, K.	United Utility Int. Ltd.
Davies, P.	Miller Northumbrian Cons.
Downie, A.	George Downie
Duckett, M.	SEPA
Dunbar, J.	Northumbrian Lyonnaise
Duthie, R.	Denholm Seafoods
Duthie, W.	Duthies Summers
Edmond, J.M.	Jedfish
Ewing, M.S.	
Gordon, H.	Aberdeen Fish Salesmen's Association
Hamilton, D.	Croan Seafoods Ltd.
Henderson, R.	AWT Ltd.
Howgate, P.	
Jones, P.	NOSWA
Korsager, H.	United Fish Products
Laint, G.	Mott Babtie IV
Lake, I.D.	Caley Fisheries Ltd.
Leatherbarrow, B.	Northumbrian Lyonnaise
Leatherbarrow, B.D.	Halcrow Crouch Consulting Engineer
Leiper, D.	Andrew Leiper & Sons Ltd.
Low, G.	NOSWA
MacLeod, M.	Fisheries Development Officer, Stornoway
Main, S.	Marine Fisheries Ltd.
Masson, J.G.	Allan-Day Ltd.
McGreevy, M.	Northumbrian Lyonnaise
Mills, D.	Hyder Consulting
Mitchell, I.	United Fish Products
Murphy, F.	Mott Babtie IV
Pacitti, G.	G. Pacitti Foods Ltd.
Panton, D.I.	Ecolibrium
Paterson, J.M.	Peterhead Harbour Trust
Pollington, D.	Miller Northumbrian

Ramsay, W.E.	A. Ramsay/Magnus Gray Ltd.
Reep, D.C.	Optima International
Richards, K.	John Richards & Sons
Roger, S.W.	Mender & Garry Ltd.
Rose, G.	SEPA
Rowantree, T.	Enviro-Marine Ltd.
Saward, D.	Fisheries Research Services
Scoble, R.	NOSWA
Scott, D.	Abascus Frozen Foods Ltd.
Sharkey, W.J.	McLaughlin Partners
Sill, J.M.	Optima International
Simm, M.A.	Kilron Seafoods
Simpson, C.	John Richards & Sons
Simpson, T.	Denolm Seafoods
Slater, J., MBE	SPFA
Smith, I.	Noble Brothers (Fraserburgh) Ltd.
Smith, M.	United Utility Int. Ltd.
Soetens, R.	Enviro-Marine Ltd.
Somers, J.M.	BIM
Steven, D.I.	Deveron Group Ltd.
Tough, M.	Moray Seafoods Ltd.
Turnbull, N.	Mott Babtie IV
Turner, R.J.	Cawoods (Fishcurers) Ltd.
Walker, C.	NOSWA
Watt, J.	Don (Peterhead) Fishing Co.
Willox, A.	Croan Seafoods Ltd.
Wouda, A.	EWM-3