INFORMATION

NRA

National Rivers Authority

Severn-Trent Region

HEADQUARTERS

Sapphire East, 550 Streetsbrook Road,
Solihull, West Midlands B91 1QT.
Telephone: 021-711 2324.

NRA

National Rivers Authority
Severn-Trent Region

Severn catchment below River Teme confluence
including River Avon:
Lower Severn Area Office,
Riversmeet House, Newtown Industrial Estate,
Northway Lane, Tewkesbury GL20 7JG.
Telephone: (0684) 850951

Severn catchment down to and including
River Teme confluence:
Upper Severn Area Office, Hafren House,
Shelton, Shrewsbury SY3 8BJ.
Telephone: (0743) 272828

Trent catchment down to and including
River Dove confluence:
Upper Trent Area Office, Sentinel House,
Wellington Crescent, Fradley Park,
Lichfield WS13 8RR.
Telephone: (0543) 444141

Trent catchment below River Dove confluence:
Lower Trent Area Office, Trentside,
Scarrington Road, West Bridgford,
Nottingham NG2 5FA.
Telephone: (0602) 455722

Headquarters: *Sapphire East, 550 Streetsbrook*
Road, Solihull, West Midlands B91 1QT
Telephone: 021-711 2324

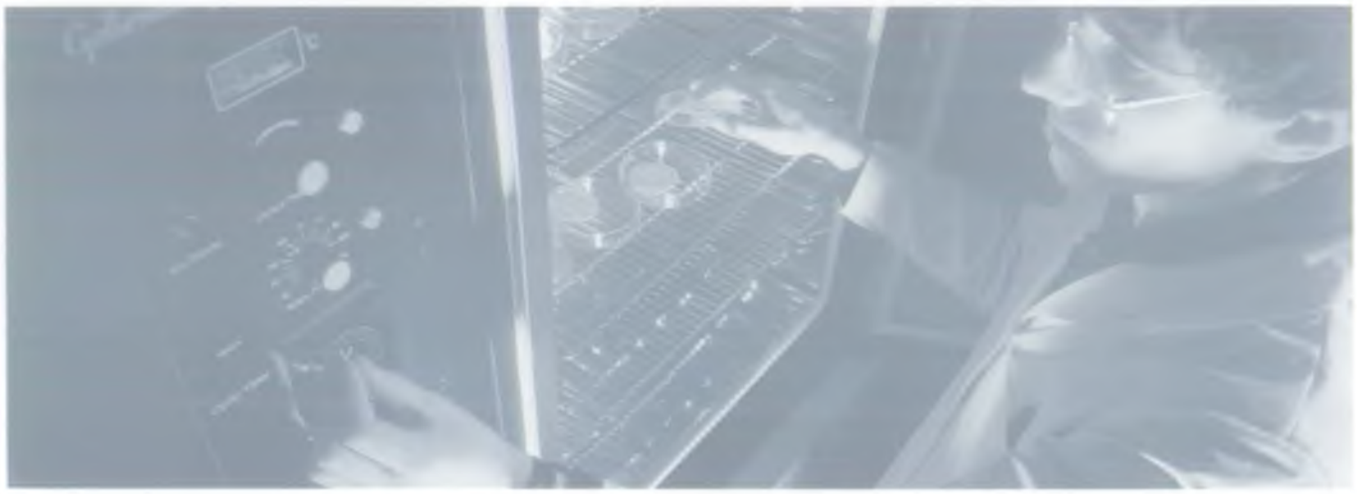
NRA

Severn-Trent Region

QUALITY CLASSIFICATION CHART

LENGTHS OF RIVER IN KILOMETRES (PERCENTAGE OF TOTAL)						
YEAR	1A + 1B	2	3	4	X	TOTAL
1975*	2223 (56.2)	1182 (29.8)	291 (7.4)	263 (6.6)	-	3959
1979/80	3005 (58.0)	1629 (31.4)	412 (8.0)	98 (1.9)	35 (0.7)	5179
1980/81	3015 (58.2)	1679 (32.4)	368 (7.1)	81 (1.6)	35 (0.7)	5178
1981/82	3020 (58.3)	1683 (32.5)	363 (7.0)	77 (1.5)	35 (0.7)	5178
1982/83	3016 (58.2)	1709 (32.9)	349 (6.7)	77 (1.5)	35 (0.7)	5178
1983/84	3021 (58.3)	1710 (33.0)	341 (6.6)	71 (1.4)	35 (0.7)	5178
1984/85	3021 (58.3)	1702 (32.9)	348 (6.7)	72 (1.4)	35 (0.7)	5178
1985/86	2893 (55.8)	1736 (33.5)	445.5 (8.6)	71.5 (1.4)	35.5 (0.7)	5181.5
1986/87	2888 (55.5)	1718.5 (33.0)	488 (9.4)	71.5 (1.4)	35.5 (0.7)	5201.5
1987/88	2888 (55.5)	1703.5 (32.8)	494 (9.5)	80.5 (1.5)	35.5 (0.7)	5201.5
1988/89	3147.5 (54.9)	1899.6 (33.2)	559.3 (9.8)	82.3 (1.4)	39.3 (0.7)	5728**
1989	3141.5 (54.8)	1902.9 (33.2)	554.8 (9.7)	89.5 (1.6)	39.3 (0.7)	5728**
OBJECTIVE	3369.4 (58.8)	2094.3 (36.6)	225 (3.9)	0 (0.0)	39.3 (0.7)	5728**

*An earlier estimate based on a more restricted range of rivers.
**Increase in overall river length resulted from major review of classified reaches.



Each species has a narrow range of environmental conditions which best suit it; biological studies of organisms therefore provide quite accurate information about the condition of a river.

Chemical analysis will show the quality of the water at the time of sampling but may miss any pollution which happens in between samples.

A biological survey shows if pollution has occurred continually or intermittently during preceding months.

The fish life inhabiting particular stretches of water are also regularly examined since the numbers, condition and type of fish, may show the state of the water and tell if it is improving, or deteriorating, in quality.

River water quality Rivers are classified according to their quality and improvement targets are set.

The quality classifications are:

Class 1A and 1B – Water of high quality, suitable for drinking and other use. Capable of sustaining high class fisheries and of high amenity value. Class 1A is superior to Class 1B.

Class 2 – Water suitable for drinking only after advanced treatment, but capable of supporting satisfactory coarse fisheries and of reasonable amenity value.

Class 3 – Water from which fish may be absent or only rarely present and which is suitable for low-grade industrial use only.

Class 4 – Water which is grossly polluted and likely to cause a nuisance.

Class X – Insignificant watercourses and ditches not usable, where the objective is simply to prevent nuisance developing.

The following table shows how river water quality has improved since 1975. Our long term objectives are also shown.

It can be seen that in 14 years the percentage of the grossly polluted rivers has decreased from 6.6 to 1.6 per cent. Most of the Class 4 rivers are in the Birmingham and Black Country conurbations.

The principal rivers to be improved are the Erewash (21km), Amber (11km), Churnet (31km), Blythe (60km), Tame (69km), Stour (47km) and tributaries of the Tame in the Black Country (44km). The majority of our objectives will be achieved by 1995.

A major factor in the improvement of the River Tame has been a "necklace" of purification lakes – the only ones in the country.

works. Here, sewage and trade effluents are treated to acceptable standards before being discharged. But when rainfall is heavy, sewers may overflow into a river and cause pollution.

Agriculture Agriculture is the growth industry as far as water pollution is concerned and incidents caused by farm wastes can have catastrophic effects on rivers and other watercourses. Pollutions involving spillages of silage and farm slurry are particularly serious.

Silage liquor, even when heavily diluted, is one of the most lethal substances to aquatic life and can wipe out all the fish and wildlife in an affected watercourse. Farm slurry is another major killer which, like silage, removes dissolved oxygen from the water.

Toxic, spent sheep dip and its empty containers are another hazard with a real risk of chemicals finding their way into watercourses. Ditches, even if they are sometimes dry, are still legally classed as watercourses if they eventually connect to a natural watercourse.

Other dangers on the farm include, storage and use of oil, pesticides and herbicides and the improper disposal of other dangerous substances.

In the past Fortunately, the days when rivers were covered in thick blankets of deadly foam are largely past. The foam resulted from the early soapless "hard" detergents which were not biodegradable – that is, capable of being broken down by bacteria.

Affected rivers suffered a reduction in dissolved oxygen levels and the amount of light entering water was severely reduced. Because plant life cannot flourish without light, the food chain fails and so does the river's life.

Ordinary soaps are made of natural substances (vegetable oils or animal fats) which bacteria can rapidly "feed" on and break down. Modern "soft" synthetic detergents can also be broken down by bacteria. But, both can still cause a depletion of oxygen as the bacteria break them down.

Britain's industrial decline has had a large effect on improving river quality by reducing the industrial discharges from heavy industry which were so damaging.

Old style coal-gas works were major polluters, but have now been made redundant by North Sea gas.

Pollution control Samples of river water are taken at regular intervals from many survey points and analysed. When a major pollution is discovered the National Rivers Authority investigates the source and stops it. Legal action may be taken against people causing pollution and the costs of any cleaning-up exercise recovered.

Any discharge of trade or sewage effluent must have our permission. We set the standards for the quality and quantity of the discharge so that the watercourses are protected and we regularly take and analyse samples to ensure standards are being met.

Pollution changes the flora and fauna which would normally be found in unpolluted rivers and different groups of aquatic plants and animals vary in their degree of resistance to pollution.

Good mixing is important to get nutrients and dissolved oxygen to all parts of the water and this is best done by fast moving, turbulent streams. Small, rapidly flowing streams are nearly always saturated with dissolved oxygen but large, slow rivers are often not.

Temperature also plays an important part in the life of a river by affecting the saturation level of dissolved oxygen. Increased water temperature stimulates fish to grow at a faster rate, but at the same time the oxygen solubility is reduced if the water temperature is raised. This means that demands for oxygen are higher when its availability is lower.

Coarse fish, such as perch, roach and chub, can withstand temperatures of up to 30°C but game fish, such as salmon or trout, die if the water moves outside the 5-20°C range.

Water normally contains dissolved oxygen to the extent of 10 parts of oxygen per million of water. This varies slightly during the year because of temperature effects.

The minimum dissolved oxygen concentration necessary to maintain fish in a healthy condition is around five parts per million. Although fish can survive in lower conditions than this, some species, such as salmon and trout, require higher levels than others. Dissolved oxygen levels lower than 2.5-3 parts per million may result in fish deaths.

A lack of dissolved oxygen means many forms of life, including fish, cannot be supported. In the most severe cases of pollution all the normal animal and plant life of the river may disappear.

Industry Industrial processes such as chemical manufacture and electroplating and the excessive use of weedkillers can all result in serious damage to river life if allowed to escape into the river.

Cyanide or solutions of heavy metals such as copper, chromium and zinc as well as many other chemicals can get into rivers from industrial discharges. If they are released into water which has already been reduced in oxygen content they can be even more lethal than usual, due to the weakened state of the fish.

Inorganic pollution normally comes from industrial processes. Many inorganic substances are toxic to fish and fish food. The most common are free chlorine, ammonia, sulphides, cyanides and heavy metals. A combination of these can be more toxic than the individual substance. Certain species of fish are more resistant to toxic materials than others. Sometimes fish food are more sensitive to a particular poison than the fish.

Toxic substances that don't immediately kill fish can still have serious effects by driving fish away, preventing successful breeding or weakening any fish that remain.

Spillages do not have to be large to have a serious effect. One gallon of carbolic acid needs diluting by one thousand million gallons of water before it is suitable for abstraction for drinking water. One gallon of oil can cover four acres of water surface and spillages of what most people would regard as harmless, such as beer, molasses and milk, can cause very serious water pollution problems.

A high proportion of the major discharges to rivers are from sewage

Pollution Pollution is the act of destroying the purity of water. A certain amount of natural pollution arises from decaying vegetable matter and impurities washed out from the soil, but the majority of river pollutions originate from the community and industry around its banks.

Pouring liquids and chemicals which are harmful to animal and plant life into water can cause pollution. It can also be caused by discharges of sewage and trade effluents and by accidents involving spillages, such as a tanker crash.

Apart from the plants and animals which can be seen by the naked eye, there are many very small species which are vital to the life of the river.

River life Organic and inorganic nutrients are an essential food supply for river plants and animals. Oxygen is equally essential.

Water dissolves oxygen from the air until it becomes saturated.

Most organic matter present in water, in either suspension or solution, is a food supply for bacteria and fungi. They multiply in proportion to the amount of organic matter available and consume oxygen. If the rate of oxygen consumption exceeds the rate at which oxygen is dissolved by the water, levels of dissolved oxygen in the water will decrease. The Biochemical Demand (BOD) is a measure of the oxygen demand in a river. This is a measure of how much oxygen is used up in a standard test done for five days at 20°C.

Anything with a high BOD, or which results in the formation of something with a high BOD, is a potential pollutant. Most organic substances have a high BOD, for example soluble carbohydrates discharged in effluent from sugar refining, breweries, paper making and milk processing.

Ammonia exerts a high oxygen demand and is also toxic. Some nitrogen compounds are converted by natural processes into organic nitrogen containing compounds with a high BOD.

To complicate the problem, nitrogenous compounds are important plant foods and provide a "soup of plant nutrients" in which aquatic plants grow and reproduce rapidly. The result is increased dead plant material, increased BOD and lowered dissolved oxygen levels. When most of the dissolved oxygen has been removed, oxygen is taken out of any nitrates or sulphates present. The resulting change from an aerobic to an anaerobic state produces hydrogen sulphide – the smell of stagnant water, rotten eggs and also ammonia.

In the water that runs off the land there are some substances which do not dissolve but are carried along as suspended solids. Quantities tend to be higher in winter because of higher rainfall and melting snow. Depending on the size and speed of the river, the solid particles may settle out.

All sizes of particles reduce the light penetration and, therefore, photosynthesis which in turn means a slowing in the growth of plant life. Very small particles which settle on the bottom of the stream may have a blanketing effect which will prevent some bottom-dwellers from living there.

WATER POLLUTION AND ITS EFFECTS

NRA

National Rivers Authority

Headquarters: *Sapphire East, 550 Streetsbrook Road, Solihull, West Midlands B91 1QT*
Telephone: 021-711 2324

NRA

Severn-Trent Region

HOW TO CONTACT US

Headquarters: *Sapphire East, 550 Streetsbrook Road, Solihull B91 1QT. Tel: 021-711 2324.*

Upper Trent Area: *Sentinel House, Wellington Crescent, Fradley Park, Lichfield, Staffs. WS13 8RR. Tel: 0543 444141.*

Lower Trent Area: *Trentside Offices, Scarrington Road, West Bridgford, Nottingham NG2 5FA. Tel: 0602 455722.*

Upper Severn Area: *Hafren House, Welshpool Road, Shelton, Shrewsbury SY3 8BB. Tel: 0743 272828.*

Lower Severn Area: *Riversmeet House, Newtown Industrial Estate, Northway Lane, Tewkesbury GL20 7JG. Tel: 0684 850951.*

We investigate all land drainage schemes and river maintenance operations and resolve any potential conflicts between engineering requirements and conservation issues.

In a typical year, 100 conservation enhancement projects are implemented, involving the planting of more than 250,000 trees and shrubs and digging about 25 pools in wetland areas.

A high priority is given to enhancement schemes in urban areas.

Our planting schemes use trees and shrubs which are locally indigenous. We are propagating the Black Poplar and Wild Pear, neither of which are commercially available. Propagation from local, true, varieties will alow them to flourish again.

Flood Defence More than 30,000 properties and 154 sq miles (400 sq kms) of agricultural land in the region are protected by flood defences.

Major flood defence schemes recently completed, or on-going, include work on the River Avon in Rugby, the Soar in Leicestershire, the Tame in Birmingham and the Black Country and the Severn estuary in Gloucestershire. All schemes benefits are carefully evaluated before starting to ensure value for money and priority is increasingly given to schemes in urban areas which protect homes and property.

We use our legal powers to control development on flood plains and ensure flood flows are not impeded – thereby causing more severe problems, or damage, in future floods.

Rivers are natural drains and they must be maintained. Our staff carry out an extensive programme of dredging, weed cutting and the removal of trees and other obstructions. In a typical year we remove a million tonnes of silt, mow 24 million square yards (20 million sq metres) of flood banks and remove 30,000 fallen or unsafe trees, although as part of our enhancement work we plant many more.

Rainfall and river levels across the region are constantly monitored by using the latest technology and at times of heavy rain or rising river levels we issue warnings to the emergency services who then contact people at risk in riverside locations. These warnings can save lives and property.

Our rivers engineers liaise closely with landscape architects and a special budget is set aside for conservation work connected with flood defence schemes.

are today but also being able to predict them in the future and stopping mistakes being made. That is why we are consulted about industrial and residential development as well as the siting of such things as waste tips.

Discussions are underway with Government and the agricultural industry about solutions to rising nitrate concentration in groundwater – including the likely restriction of land use in sensitive areas which surround boreholes.

Environmental Quality To maintain, and wherever possible improve, the quality of rivers and watercourses, we set standards for any discharges into rivers and streams and make sure those standards are met.

In the front line of this work are our pollution control staff who are on call 24 hours a day, 365 days a year.

More than 60,000 samples are taken and analysed each year at our modern chemical laboratory in Nottingham. An average of 10 tests are carried out on each sample.

More than 4,000 pollution incidents are reported annually and all of them are investigated. Painstaking detective work is necessary before it is possible to consider bringing a prosecution.

Our biologists study invertebrate life on the river bed to check for unusual chemical pollution or occasional pollutions not detected by chemical analysis.

Prevention is always better than cure and our experts are happy to offer constructive advice to prevent pollution.

Fisheries, Conservation and Recreation Because a good population of fish is a vital component of a healthy river system, we have an on-going programme of fish survey work. We put several tonnes of quality fish into Midlands rivers and pools each year. Many of the fish are reared at our own highly successful fish farm at Calverton, in Nottinghamshire. The farm produces 100,000 chub, dace and barbel in a typical year.

Fisheries officers rescue fish which are threatened by pollution, or activities such as pool dewatering and move them to safe waters and we are also responsible for issuing fishing licences in the region.

The National Rivers Authority

National Rivers Authority The National Rivers Authority came into being in September 1989, under the Water Act 1989.

An independent public body, it is responsible for protecting and, where possible, improving the water environment. Its main tasks are: water resource management, water quality and pollution control, fisheries, conservation and recreation, flood defence and, in some areas, navigation.

Severn-Trent Region Centred on the Midlands, the Severn-Trent Region is one of 10 regional units of the NRA. The second largest, both in size and population, we cover more than 8,000 square miles (21,600 sq kms) containing nearly 4,000 miles of rivers and watercourses and with a population of 8.25 million.

We employ about 860 people, some 195 of them working from our headquarters in Solihull and the rest at offices and depots throughout the region.

Our region is based upon the catchments of two great rivers – the Severn and the Trent. Its borders stretch from the Bristol Channel in the South to the Humber Estuary in the North and from Mid-Wales to the East Midlands.

In the Severn-Trent Region, navigation is the responsibility of the British Waterways Board and a number of navigation trusts.

Catchment Management Catchment management, or water resource management, involves the protection of vital water resources from both pollution and over-exploitation. All water abstractors, including water companies, must have a licence from us for taking water from rivers and aquifers.

To help regulate river flows, we can release water from reservoirs such as Llyn Clwedog in Mid-Wales, which regulates the River Severn, topping it up in summer. The Shropshire Groundwater Scheme also enables water from an underground aquifer to be released into the River Severn at times of low flow.

We oversee the management of the River Derwent in Derbyshire to ensure that environmental and fisheries interests are protected on this extensively used river.

Protection of water resources from pollution means knowing not just what the problems

GUARDIANS OF THE WATER ENVIRONMENT

NRA

National Rivers Authority

NRA

Pollution – a success story

Once one of the most polluted major rivers, the River Trent is now recognised as one of the best fisheries in the country.

Twenty years ago anglers might have hoped to catch small roach or gudgeon on the middle reaches of the river downstream of the river Tame – but that was all. Now barbel, bream, chub and dace abound.

Salmon are also returning to the river and although they are few in number, anglers would never have dreamed of hooking this magnificent fish a few years ago.

Crucial to the success in cleaning up the Trent has been the work on its major tributary, the River Tame.

In the 1960s the quality of the River Tame was no better than a poorly treated sewage effluent. Under storm conditions the river was often completely without dissolved oxygen.

Flowing through the industrial West Midlands, the river receives massive inputs of sewage and industrial effluent as well as large amounts of polluted run-off during wet weather.

The closure of old sewage works and the building of modern ones along with river purification lakes has resulted in major improvements. A coarse fishery has been established in the lower reaches of the river for the first time in more than 100 years.

Pollution doesn't only occur between 9am and 5pm, Mondays to Fridays. It can, and does, happen at any time of the day or night. The NRA's pollution control offices are on call 24 hours a day, 365 days of the year.

If you see any signs of water pollution contact us immediately on any of the following numbers.
Solihull 021-711 2324
Lichfield 0543 444141
Nottingham 0602 455722
Shrewsbury 0743 272828
Tewkesbury 0684 850951

Headquarters
Sapphire East
550 Streetsbrook Road
Solihull B91 1QT.
Tel 021 711 2324.

NRA

Pollution – what to look for

Study the stream and its banks under various conditions so that you know its normal appearance at all times.

Any changes, such as an alteration in the colour of the water, an increase in cloudiness or signs of a film on the surface should be noted. It is also worth noting changes in the smell of the water since this can also be an indication of pollution.

Changes in the type, distribution and quality of plant growth are often due to a change in water quality.

Any signs of distress or change in the normal behaviour pattern of fish can warn of pollution before it becomes serious enough to kill them. Look for: fish gasping near the surface, sudden movement – including jumping out of the water, swimming slowly on their sides, stunted growth or patches of skin infection – they may be an indication of pollution.

Foam patches on water may be a sign of pollution from farm or factory drainage. Heavy foaming is serious since it may be a sign of major pollution.

But, foam patches downstream of a weir or other turbulent water is not always a sign of pollution. Peaty waters can give this effect and some streams, at times of high flow, may produce foam patches because of natural run-off from the land.

If fish are found dead, dying or in distress, it is important to discover the source of the pollution as soon as possible. Contact the National River Authority's pollution control office immediately if you suspect a river or stream is polluted.

Pollution – the NRA's job

The National Rivers Authority was set up in September 1989, under the 1989 Water Act, to protect the water environment.

Dischargers of trade and sewage effluent to rivers must have our permission to do so. We set the quality and quantity standards the dischargers must meet in order to protect the watercourse. Samples are regularly taken and analysed to ensure the standards are being met. If they are not then we may prosecute.

Our pollution control officers also keep watch on our rivers, streams and canals and take samples to check there has been no pollution of the water.

When pollution is discovered we try to identify the source, stop it and where possible, remove the pollution. Different types of pollution need different methods. Oil may be contained by booms or straw bales and suction hoses, or specially designed absorbent materials, used to draw the oil off the water.

One of the most common effects of pollution is a reduction in the level of oxygen in the water. This can have serious consequences for future plant and fish growth. In these cases an aerator may be used to try to replace the oxygen in the water.

Any downstream users of river water are informed of a pollution incident that may affect them, particularly where water supply, spray irrigation or cattle watering are involved.

NRA

Pollution – its dangers

Pollution destroys the purity of water and can pose a serious threat to drinking water supplies and people who come into contact with polluted river water, such as canoeists or children paddling.

Fish, plants, wildfowl, livestock and wild animals can all be killed by highly polluted water.

Pollution – where it comes from

Pollution can happen naturally as a result of decaying plant life and impurities washed from the soil. But most pollution is man-made and comes from the community and industry around the river banks.

Man-made river pollution can result from several causes – industrial discharges, discharges from farms, including run-off from agricultural wastes and fertilisers, seepage from waste sites and discharges from sewage works and sewers.

A high proportion of the major discharges to rivers are from sewage treatment works where sewage and trade effluents are treated to acceptable standards before being discharged into rivers. When rainfall is heavy, sewers may overflow into the rivers and cause pollution.

Pouring any liquid or chemical which is harmful to animal and plant life into a watercourse can cause pollution. Ditches, even if they are sometimes dry, are still legally classed as watercourses if they eventually connect to a natural watercourse.

Pollution – biological changes

Pollution which does not immediately kill fish can still have serious effects if it continues for any length of time. It can drive fish away, prevent successful breeding and seriously damage any fish which remain.

Apart from the plants and animals which can be seen by the naked eye, there are many very small species which are vital to the life of the river. If any of the complex components of river life are harmed the whole life cycle of the river and its inhabitants can be affected.

Chemical analysis of water by laboratories will show the quality of the water at the time of sampling, but may miss any pollution which occurs at other times. A biological survey shows if pollution has occurred during the preceding months.

Pollution and how to spot it

NRA
National Rivers Authority
Severn-Trent Region

The NRA's Pollution Control Offices can be contacted 24 hours a day on the following telephone numbers:

BIRMINGHAM..... 021-711 2324
LICHFIELD.....(0543) 444141
NOTTINGHAM.....(0602) 455722
SHREWSBURY.....(0743) 272828
TEWKESBURY..... (0684) 850951

Headquarters: *Sapphire East, 550 Streetsbrook Road, Solihull, West Midlands B91 1QT*
Telephone: 021-711 2324

NRA

National Rivers Authority
Severn-Trent Region

SILAGE EFFLUENT

Each year many serious pollution incidents happen because of inadequate containment or disposal of silage effluent.

Effluent from ensiled crops is one of the most concentrated pollutants produced on the farm and is at least 100 times stronger than crude sewage. Even small quantities reaching a watercourse can cause significant environmental damage.

Poorly designed or maintained silos or associated effluent collection facilities are the main cause of such incidents. Silage effluent is very corrosive and can easily attack concrete and steel. Liquor can easily escape through cracked, porous or otherwise deteriorated silo floors, collection channels or tanks.

New, enlarged or substantially reconstructed silos, with certain exceptions, must conform with the Control of Pollution (Silage, Slurry and Agricultural Fuel Oil) Regulations 1990.

The main requirements are:

1. The silo base should be impermeable and be provided with perimeter channels for effluent collection.
2. Where walls are provided, the silo base should be extended beyond the walls to provide channels for effluent collection.
3. Collection channels must lead to an effluent tank which is resistant to acid attack. It should have a minimum capacity of $3m^3$ per $150m^3$ of silo capacity for silos up to $1500m^3$ capacity.
4. No part of the silo, effluent tank or channels should be within 10 metres of a watercourse.
5. Silo walls should be constructed to minimum standards to conform with BS 5502.
6. The NRA should be notified, in writing, at least 14 days before use.

For further details see the Control of Pollution Regulations 1990.

Safety Notes

a. Effluent collection channels and the area surrounding the silo should be regularly inspected for any signs of blockage or leakage.
b. The level of the effluent in the tank must be closely monitored and the tank emptied at regular intervals. It must never be allowed to overflow.
c. Bales should be stored at least 10 metres from any watercourse. At feeding time the bags or wrappings of the bales should not be removed within 10 metres of any watercourse.
d. Silage effluent should be diluted 1.1 with water before land application. Effluent should not be applied to high risk sites.
e. Inspect drains, ditches and watercourses regularly for signs of pollution and inform the NRA immediately if a problem occurs.

NRA

National Rivers Authority

Severn-Trent Region

NITRATES IN GROUNDWATER

NRA

National Rivers Authority

Introduction Nitrates are naturally occuring compounds of nitrogen, an element essential for life. They are formed in the atmosphere by the action of electrical storms and in the soil, by bacteria. Because they are very soluble they are the most usable form of nitrogen for plants and, up to a certain limit, the more nitrate taken in, the greater the growth rate.

Modern agricultural methods have used nitrates in increasing amounts so that higher growth rates, and therefore greater production, is achieved. The use of nitrogen containing fertilizers, together with improvements in selective breeding of crop types, has led to the food in the Western world being plentiful and cheap. But these benefits are not without their problems.

Nitrates are washed, or leached, from the soil into ditches and watercourses because they are so soluble. Some get washed below the soil layer and into the underlying rocks. Rocks which contain large amounts of water which can be pumped out by a well or borehole are called aquifers, and the water, groundwater. Nitrates washed from the soil infiltrate very slowly into the aquifer until they reach the water table. It may take many years, or even decades, for the groundwater to be affected significantly. Nitrates move downwards at the rate of around only two metres each year in the case of some sandstones. In other aquifers, such as limestones, water moves quickly through cracks and fissures.

Groundwater Approximately one third of the nation's drinking water supply is pumped from underground. This water is normally very clean and needs very little treatment.

In 1985 the European Commission's Drinking Water Directive set a new limit of 50 milligrams per litre for nitrates in drinking water. Before this the accepted limit had been the 100 milligrams per litre, set by the World Health Organisation. This new maximum caught up several sources which were over 50mg/1 and the then water authorities (now water companies) had to either abandon the source or put in blending mains to reduce the concentrations in supply.

Examination of the historic trends in nitrate levels showed that a large number of other sources, currently low in nitrate, would exceed the maximum level in the future. These increasing trends are now agreed to result mainly from the effect of agricultural practice in past years.

Leaching How much nitrate is leached from the soil depends on a number of things. It is not just a result of higher levels of fertilizer being applied.

Ploughing old grassland releases large quantities of nitrate which would have been locked up by the root system and, if the land is left bare after ploughing, leaching will occur. Large increases in the areal extent of arable cropping since the war is a significant factor in increasing the amount of nitrate released to groundwater. Intensification of livestock units has also added to the nitrate problem as large quantities of slurry applied to inadequate land areas can lead to excessive leaching. Climate is another major factor.

In the drier parts of eastern England the amount of dilution from rainfall is much less than in the wetter west and so the

nitrate concentrations of the water filtering through to the water table is therefore much higher. There is also a higher proportion of arable land in the east. These two factors combine to make the situation much worse in East Anglia and the East Midlands.

Treatment and blending The existing problem can be cured by laying new mains or building treatment plants. Water companies are then able to blend high nitrate water with low nitrate water. However, where the low nitrate source is many miles away, treatment may be a more economic option.

These solutions are very expensive and will become increasingly so as nitrate continues to build up in groundwater.

Land use and agricultural practice The amount of nitrate leaching to groundwater can be minimised by changing land usage or by modifying agricultural practices.

Low intensity grassland and broadleaved woodland are both known, from extensive research, to leach very low amounts of nitrate. Changing from arable cropping to either of these over a specific area around a borehole would reduce the nitrate concentration in the long-term. However, the farmer's income would also be reduced.

Modifying farming practice by reducing fertilizer applications, split dressings, maintaining a crop cover in winter, more controlled applications of slurry and minimising the amount of grassland ploughing, would also work. But these practices would need to be applied over a much wider area and would therefore affect more farmers. Again, their income would be reduced.

The Nitrate Sensitive Area Scheme It is against this background that the Nitrate Sensitive Area Scheme has been set up. Powers are incorporated in the Water Act 1989, Section 112 for areas to be designated where land use controls could be compulsorily imposed. The scheme is, however, essentially a pilot one to assess the levels of voluntary participation by farmers.

The scheme includes compensation for farmers who suffer a loss of income.

The scheme is administered by the Ministry of Agriculture, Fisheries and Food and the NRA advises on the location and extent of catchment areas to the boreholes. Ten pilot areas have been set up in different parts of the country with a wide spread of geological and soil types, farming practice and climatic differences.

Monitoring of groundwater, surface water and water leached from the soil will take place for a five year period to allow us to assess how effective the measures have been.

The Future The simple fact is that nitrates will continue to rise in groundwater unless farming practice changes. A new EC Directive is likely to be introduced in 1990 which will enshrine nitrate controls in European law. We will continue to work with both the farming community and the water companies in trying to resolve the nitrate problem within the framework of the legislation.

Severn catchment below River Teme confluence including River Avon:
Lower Severn Area Office,
Riversmeet House, Newtown Industrial Estate,
Northway Lane, Tewkesbury GL20 7JG.
Telephone: (0684) 850951

Severn catchment down to and including River Teme confluence:
Upper Severn Area Office, Hafren House,
Shelton, Shrewsbury SY3 8BJ.
Telephone: (0743) 272828

Trent catchment down to and including River Dove confluence:
Upper Trent Area Office, Sentinel House,
Wellington Crescent, Fradley Park,
Lichfield WS13 8RR.
Telephone: (0543) 444141

Trent catchment below River Dove confluence:
Lower Trent Area Office, Trentside,
Scarrington Road, West Bridgford,
Nottingham NG2 5FA.
Telephone: (0602) 455722

Headquarters: *Sapphire East, 550 Streetsbrook Road, Solihull, West Midlands B91 1QT*
Telephone: 021-711 2324

NRA

Severn-Trent Region

PESTICIDES

All pesticides, even when diluted, are highly toxic to fish and other water life. There is also increasing concern about the levels of pesticide found in water sources.

Every year, there are pollution incidents that are a direct result of poor preparation, application or disposal of pesticides. Safe storage of undiluted pesticides, careful application near watercourses, safe disposal of both diluted solution and the empty containers are all essential in order to prevent water pollution.

The effective management and control of pesticides should aim to produce no waste. To do this, the amount needed should be carefully calculated and the application rate controlled effectively. Even so, most spraying operations will leave some diluted solution that needs disposal.

Filling and washing of containers should only be done in a place specifically built so that any spillages are contained in that area.

When the spraying is completed all equipment should be cleaned, washed and rinsed. An efficient flushing system, instead of filling the tank with water, will considerably reduce the volume of washings produced.

The use of a soakaway is unlikely to be acceptable but there are a number of other options for disposing of the washings:

1. Re-use for making further batches of spray.
2. Removal by specialist waste disposal contractors.
3. Use of suitable equipment to treat the waste. (Disposal of the treated waste should be discussed with the NRA).
4. Spraying onto uncropped land with only minimal wildlife value and poor vegetation. (Prior discussion with the NRA is essential).
5. Application to a previously untreated crop.

Storage

Pesticides should not be stored where they could pollute ground or surface waters. The NRA, Health and Safety Executive, fire authorities, local planning officer and crime prevention officer should all be consulted first.

Application

Never apply pesticides if there is a chance they could drift onto water. If you wish to use pesticides in or near water consult the NRA first. Only specially formulated herbicides should be used to control aquatic weed – check with the NRA first.

Disposal of Concentrates

It may be possible to return unwanted or unused containers to the supplier, otherwise you will have to use a reputable waste disposal contractor.

Disposal of Containers

Thoroughly clean all containers before disposal and preferably during mixing operations. Puncture containers after cleaning so they cannot be used in the future. Licenced waste disposal sites will normally accept clean containers.

For any further advice, contact your local pollution control officer at one of the NRA's offices listed overleaf:

NRA

National Rivers Authority

Severn-Trent Region

The NRA's pollution control offices can be contacted 24 hours a day on the following telephone numbers:

SOLIHULL	(021) 711 2324
LICHFIELD	(0543) 444141
NOTTINGHAM	(0602) 455722
SHREWSBURY	(0743) 272828
TEWKESBURY	(0684) 850951

Headquarters: *Sapphire East, 550 Streetsbrook Road, Solihull, West Midlands B91 1QT*
Telephone: 021-711 2324

NRA

National Rivers Authority
Severn-Trent Region

WATER ABSTRACTION

NRA

National Rivers Authority

Anyone who wants to take water from surface or underground sources, or who wishes to impound water, must be licensed by the National Rivers Authority.

The Water Resources Acts 1963-71, the Water Act 1989 and associated regulations contain legislation on the issuing of licences.

Contact the appropriate area office, or our headquarters, at an early stage so that licensing requirements can be incorporated into any scheme design. Our area staff can also give guidance on the procedures for advertising the proposals and applying for the licence.

How to obtain a licence Before making a formal application for a licence the proposals must be advertised, as a public notice, twice in the local press and once in the London Gazette. Regulations lay down the form it should take.

A copy of the notice must also be served on the local water company no later than the date on which it first appears in the local press. This also applies to any navigation, harbour or conservancy authority and any local Internal Drainage Board.

The licence application, map and any plans must be available for public inspection during a 28 day period and representations about the proposal may be made to us.

Applications to take 20 cubic metres per day, or less, may not have to be advertised. These applications should be submitted formally without advertising or service of notice. If we recommend no advertisement, the application will be formally acknowledged with effect from the date of receipt. If advertising is necessary we will return the application form so that the advertising and notification requirements can be complied with.

What the NRA does We have to check public notices, application form and maps together with any other documents to ensure that they are fully completed. The application will be formally acknowledged and we then have three months from the date of receipt to give our decision on the application. The period may be extended by agreement if required.

We have to take into account:

a) any representations received about the application

b) the requirements of the applicant

c) the existence of any 'protected rights' which may be affected (we cannot grant a licence which will derogate from an existing protected right without the consent of the person entitled to that right)

d) the effect on flows in rivers and streams, particularly their amenity value, the safeguarding of public health and the requirements of existing users, land drainage, navigation, fisheries and nature conservation.

Any licence granted will normally specify maximum quantities which may be taken per day and year and may contain conditions.

There is a right of appeal to the Secretary of State for the Environment available for applicants who are dissatisfied with our decision on their application.

Charges Abstraction charges are payable when the licence is issued and annually thereafter. They are based on the annual amount authorised by the licence irrespective of whether the water is actually used. There are however special provisions for spray irrigators.

The rate of charge depends on what purpose the water is used for, the amount of water that is returned to its source, the quality of the water taken, the reliability of the source and the season when the water is taken.

Severn catchment below River Teme confluence including River Avon:
Lower Severn Area Office,
Riversmeet House, Newtown Industrial Estate,
Northway Lane, Tewkesbury GL20 7JG.
Telephone: (0684) 850951

Severn catchment down to and including River Teme confluence:
Upper Severn Area Office, Hafren House,
Shelton, Shrewsbury SY3 8BJ.
Telephone: (0743) 272828

Trent catchment down to and including River Dove confluence:
Upper Trent Area Office, Sentinel House,
Wellington Crescent, Fradley Park,
Lichfield WS13 8RR.
Telephone: (0543) 444141

Trent catchment below River Dove confluence:
Lower Trent Area Office, Trentside,
Scarrington Road, West Bridgford,
Nottingham NG2 5FA.
Telephone: (0602) 455722

Headquarters: *Sapphire East, 550 Streetsbrook Road, Solihull, West Midlands B91 1QT*
Telephone: 021-711 2324

NRA

Severn-Trent Region

LEA MARSTON
PURIFICATION LAKES

NRA

National Rivers Authority

National Rivers Authority

THE STORY BEHIND THE LAKES

A major tributary of the River Trent, the River Tame rises in the Black Country and flows through the Birmingham conurbation before reaching open countryside at Water Orton.

In the early 19th century, before the industrial revolution, Birmingham's drinking water came from the River Tame. The quality of the River Tame declined considerably from the time of the industrial revolution. Nowadays, heavy industrial activity, poor quality sewage effluents and seepages from old disused tip sites in the upper reaches of the river have grossly polluted the Tame and its tributaries.

Seepages containing high concentrations of heavy metals, mainly copper and nickel, flow into the Tame system from the area of the former Slacky Lane Tip at Goscote and from contaminated land at Bentley Mill Lane, Darlaston. These seepages account for 30 per cent of the heavy metals in the Tame.

The normal flow in the River Tame is 55 per cent industrial waste and sewage effluent. During dry weather this can rise to 90 per cent.

Pollution levels also increase during heavy rainfall because the rain washes all the oil and other polluting matter from the city streets into the rivers. Road gritting and de-icing with Urea in the winter months also cause a severe pollution problem, particularly from Spaghetti Junction under which the River Tame flows. The possible effects on the River Trent of the pollution in the Tame led to the former Trent River Authority investigating ways of improving the river's quality.

In 1966 the Trent River Authority began investigations into the advantages of purification lakes similar to those in use on the Rhine in Germany. A pilot plant at Elford in Staffordshire and an experimental lake at Lea Marston in Warwickshire produced such good results that a full scale project was decided upon.

The site at Lea Marston was chosen because it was close to the Birmingham conurbation and had a large number of redundant sand

THE STORY BEHIND THE LAKES

and gravel pits close to the river which could be easily incorporated into the scheme.

Consulting engineers were commissioned to design the scheme and recommended that a series of seven lakes be constructed. The river would flow through the lakes at a slower rate and so allow the suspended solids to settle out.

The Mudcat

Lake 1, Tame Lake, was completed in 1982 and incorporates inlet and outlet monitoring facilities and the sludge consolidation plant. In 1986, Lakes 2A and 2B, Lake Lester and Reeve Mere, were finished.

THE LAKES

The river approaches the lake via a stilling basin which acts as a gravel trap. Floating booms upstream of the twin grit channels divert floating debris such as wood, tyres, drums, polystyrene and trees into calm areas at the side. It is removed from there by a hydraulic excavator with a mesh bucket and the debris goes to a local tip.

The total area of Tame Lake is 25 hectares and the average depth is two and a half metres. On the bottom of the lake the depth of solids can be more than one metre thick and ranges from coarse sandy material at the inlet, to fine silts at the outlet. These solids are removed from the lake by a Mudcat, a cutter/suction dredger which is a pontoon style craft powered by a 175h.p. diesel engine. A 150mm pump provides suction to a revolving scroll grazing just above the floor of the lake. The silt is then pumped along a floating pipe-line connected to the consolidation plant delivery main. A line, anchored to opposite banks of the lake, allows the Mudcat to winch itself backwards and forwards across the lake.

Measuring weirs at the head of the grit channels provide river flow information and fixed height weirs, at the three outlets from the lake, protect the existing land drainage system and ensure the slow release of the river from the lake. Continuous monitoring equipment at each end of the lake records the improvement in water quality as the river passes through the system.

THE STORY BEHIND THE LAKES

Lake Lester covers an area of 18 hectares and its average depth is two metres. Eighty per cent of the river flow passes through this lake with the remaining 20 per cent going down the existing channel.

Lake 2B, Reeve Mere, is not yet on line with the rest of the system and whether it ever will be is doubtful. The great improvement in quality when the river leaves the other two lakes could mean an increase in algal growth if Reeve Mere was put on line. This could happen due to the large amount of suspended solids that are removed in the lakes. Because of this there would be greater light penetration which encourages algal growth. This makes it likely that the quality of water leaving this third lake would be worse than when it entered.

THE CONSOLIDATION PLANT

Coarse material from the upstream end of the lakes is pumped direct to shallow grit beds to allow the heavy material to settle out before the remaining liquor is pumped to the consolidation plant. This heavy material is allowed to drain and is then carted to the on-site tip.

As the dredging operation progresses down the lake, the silts are pumped directly by the Mudcat to the consolidation plant. The liquor, usually containing between one and five per cent solids dry weight, is firstly passed through rotating bar screens to remove any pebbles and debris. This falls into trailers parked beneath the screens and is later taken to offsite tips.

The liquors are next passed through hydrocyclones which remove grit, and then into rectangular settling tanks with buoyant scrapers which push the settled silt into hoppers. Silt from the hoppers is then put into the thickening tanks where the silt is de-watered to approximately 12 per cent solids before it is pumped to Coleshill sewage works for treatment on conventional air drying beds. Grit from the hydrocyclones discharges into a shallow hopper which is emptied by tractor and trailer and tipped on site.

Herons on Lake Lester

Settled liquors from the sedimentation tanks are pumped into the thickening tanks to

remove even more liquors before the solids are pumped to Coleshill sewage works where they are drained out in the beds.

CONSERVATION

The River Tame is of major conservation value to the West Midlands conurbation. From the outskirts of Birmingham to the confluence with the River Trent, the Tame Valley is of national importance for wildfowl.

Lea Marston purification lakes provide nationally important habitats for overwintering waterbirds which are counted monthly by the Wildfowl and Wetlands Trust. Herons and swans are a common sight and large numbers of many different species have been recorded, with up to 1500 tufted duck, 800 pochard and 1200 coot being counted at one time.

THE IMPROVEMENTS

Upstream of Lea Marston purification lakes the River Tame is a Class 4 river but after passing through the lakes it improves to almost meet its quality objective of Class 2. As a result, fish populations have increased and the quality of the River Trent also benefits from the improved quality in the River Tame.

A good coarse fishery has been established below the lakes with chub, dace, barbel and roach present. Kingsbury, Tamworth and Elford all have organised club fishing and catches are often good, with mixed bags of up to 80lbs of fish. The NRA has also supplemented fish stocks in the Tame by annual stocking of chub, dace and barbel reared at their own fish farm in Nottinghamshire.

The existing lakes have already achieved all that was hoped for from seven lakes and there would be no further benefit from adding the extra lakes to the system.

A reduction in the amount of industry in the area and improvements made to the local sewerage system and sewage works have also helped improve the quality in the Tame. The NRA is also vigorously pursuing the contaminated land site problems to try and reduce pollution levels still further. This would allow the river to meet its quality objective

A swan on the Tame downstream of the lakes

of Class 3 upstream of Lea Marston.

CLASS 1A AND 1B

Water of high quality, suitable for drinking and other use. Capable of sustaining high class fisheries and of high amenity value. Class 1A is superior to Class 1B.

CLASS 2

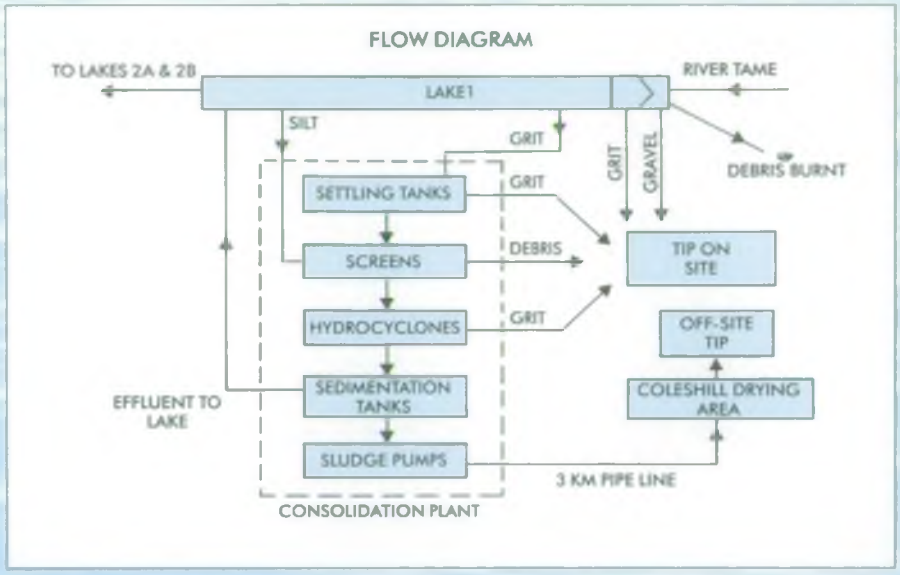
Water suitable for drinking only after advanced treatment, but capable of supporting satisfactory coarse fisheries and of reasonable amenity value.

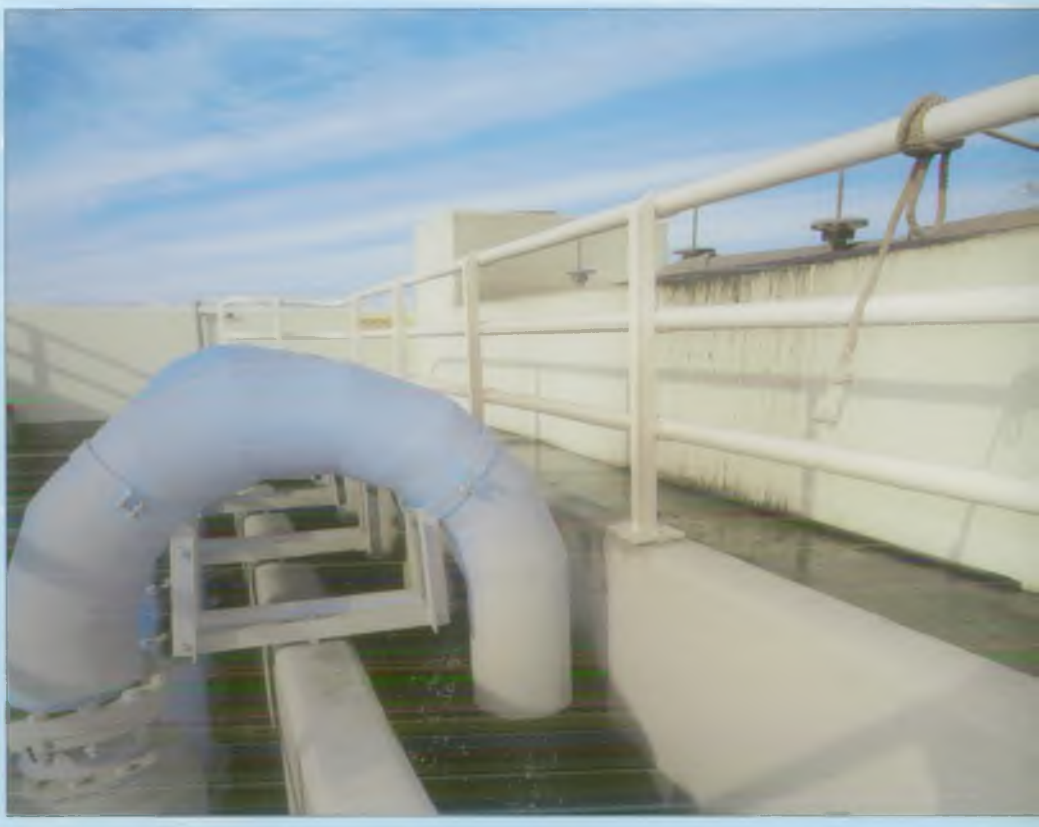
CLASS 3

Water from which fish may be absent or only rarely present and which is suitable for low-grade industrial use only.

CLASS 4

Water which is grossly polluted and likely to cause a nuisance.





Hydrocyclones used for grit removal in the consolidation plant

KEY INFORMATION

LAKE 1

Retention time @ average flow 1159 ml/d	½ day
Retention time @ D.W.F.	1 day
Retention time @ design flood flow 9819 ml/d	2.1 hours
B.O.D. inflow	8mg/l
B.O.D. reduction at outfall	20 per cent

S.S.	inflow	30 mg/l
S.S.	reduction at outfall	40 per cent
S.S.	increase during storm	X10 to X20
S.S.	retained in lake during storm	90 per cent
Area of lake		25 hectares
Average depth of lake		2.5m
Average depth of deposited material		0.5m
Gravel/Grit removed by excavators (dry weight)		5-7000 tonnes/annum
Silt removed by suction dredger (dry weight)		15-18000 tonnes/annum

Dredger pump – SIMON WARMAN, 150mm, 400m³ hr @ 5 percent D.S.
Winding speed 15m/min
Maximum tethered rope span 200m.

Grit channels – length approx 100m.
shape – trapezoidal

CONSOLIDATION PLANT

Sedimentation tanks
- 2 No. 35m. long, 15m. wide, 3.6m. deep, hoppers – 6m. deep from tank floor

Scrapers
- 4 No./tank, buoyant type, chain driven, HAWKER SIDDELEY WATER ENG. 3 kw.

Screens
- 4 No. LONGWOOD ENG. bar type with rotary brush. Type DM/S 1500. 80 l/sec. 0.75 kw.

Hydrocyclone pumps
- 3 No. Wallwin Pumps 200mm., 864 Series vertical centrifugal, 125 l/sec, 55kw.

Hydrocyclones
- 6 No. Dorr Oliver 18" type RP Dorrclones. 42 l/sec @ 20 p.s.i.g.

L.P. Sludge pumps
- 4 No. Wallwin Pumps 100mm., 1094 /11 series vertical centrifugal, 18 l/sec, 3kw.

H.P. Sludge pumps
- 1 No. Whitehead & Poole, triple cylinder reciprocating pumps, 70 l/sec @ 70m. head.

Sludge pump to Coleshill sewage works
- Warman pumps 6" – 4" centrifugal pump 75 litres per second @ 30m head.

Headquarters: *Sapphire East, 550 Streetsbrook Road, Solihull, West Midlands B91 1QT*
Telephone: 021-711 2324

NRA

Severn-Trent Region

FUEL OIL

Oil spillage or careless disposal of waste oil from farms is the cause of a significant number of prosecution incidents each year.

The Control of Pollution (Silage, Slurry and Agricultural Fuel Oil) Regulations 1990 relate to the storage of fuel oil on farms in quantities over 1500 litres.

Any existing fuel tanks used before the introduction of the regulations will normally qualify as exempt structures, but all new above ground fuel storage tanks or fuel storage areas must:

1. Be surrounded by an impermeable bund wall on an impermeable base capable of containing a specified volume (see below).
2. No part of the bund or storage area should be within 10 metres of a watercourse.
3. The bund should be constructed to give a 20 year life, with reasonable maintenance.
4. The bund should be arranged so that all parts of the tank, any taps or valves (which must discharge vertically downwards) are within the bund area. Valves should close automatically when not in use.
5. For a single tank the bunded volume should be 110 per cent of the volume stored in the tank. Where all oil is stored in drums the bund should be large enough to contain 25 per cent of the maximum volume stored.
6. No permanent outlet or drain should be fitted to the bund. The floor of the bund should slope towards a small sump. Some means e.g. a hand pump, should be provided for removing water or fuel oil from the sump for safe disposal.

For further details see the Control of Pollution Regulations 1990.

Offices

Your local NRA office listed overleaf will give advice on all aspects of water pollution control.

NRA

National Rivers Authority

Severn-Trent Region

The NRA's Pollution Control Offices can be contacted 24 hours a day on the following telephone numbers:

BIRMINGHAM..... 021-711 2324
LICHFIELD.....(0543) 444141
NOTTINGHAM.....(0602) 455722
SHREWSBURY.....(0743) 272828
TEWKESBURY..... (0684) 850951

Headquarters: *Sapphire East, 550 Streetsbrook Road, Solihull, West Midlands B91 1QT*
Telephone: 021-711 2324

NRA

National Rivers Authority
Severn-Trent Region

POLLUTION KILLS

Polluted water can kill – fish, plants, animals and birds.

Polluted rivers can seriously threaten vital water supplies. They can cause illness to people using them.

Follow these simple guidelines and help keep rivers and streams clean and safe.

Don't!

... put oil, petrol or old garden chemicals down drains or gutters.
... throw rubbish into watercourses, however large or small.
... allow anything to escape into a watercourse which may pollute it.

Do!

... ask us for advice if you are not sure how to dispose of harmful substances.
... tell us if you spill anything that may cause pollution.
... report a suspected pollution immediately.

Remember!

Pollution is everyone's responsibility.
If you see any sign of water pollution contact us – we're on call 24 hours a day.

Offices

Our pollution control staff will be pleased to advise on these matters. Contact your local officer on one of the numbers listed overleaf:

NRA

National Rivers Authority
Severn-Trent Region

The NRA's Pollution Control Offices can be contacted 24 hours a day on the following telephone numbers:

SOLIHULL..... 021-711 2324
LICHFIELD.....(0543) 444141
NOTTINGHAM.....(0602) 455722
SHREWSBURY.....(0743) 272828
TEWKESBURY..... (0684) 850951

Headquarters: *Sapphire East, 550 Streetsbrook Road, Solihull, West Midlands B91 1QT*
Telephone: 021-711 2324

NRA

National Rivers Authority
Severn-Trent Region

POLLUTION
WE'RE ALL RESPONSIBLE

NRA

National Rivers Authority

Pollution - what it can do We all need water to live. A river or stream that becomes polluted can pose a serious threat to people coming into contact with it, such as children paddling, or canoeists. It could also be a danger to animals drinking from it.

Oxygen is also vital for life. One of the main results of pollution is a reduction in the amount of oxygen in the water, resulting in death to the fish and other life in the river.

Pollution can kill. Fish and plant life, livestock and wild animals can be killed by highly polluted water. One gallon of oil can cover four acres of water surface – the size of eight football pitches! Large quantities can leave birds and plants badly oiled. Swans and ducks are often victims.

Pollution - what causes it? River pollution can result from several causes – industrial discharges, discharges from farms (including run-off of agricultural wastes and fertilisers), seepage from waste tips and discharges from sewage works.

There is a wide range of possible incidents which may cause pollution, ranging from road and rail accidents involving tankers, to discharges of farm wastes. Some are accidental, some are deliberate, some due to vandalism and some to negligence.

Pollution - the National River Authority's job The NRA was set up in September 1989 to protect and improve the water environment. The control and prevention of pollution is a major part of our duties. We monitor river water quality to help us in improving or maintaining its quality and readily give pollution prevention advice to farmers and industrialists.

Many water pollutions cannot be seen with the naked eye so samples of river water are regularly taken and analysed. When a major pollution occurs we take steps to discover the source and ensure it doesn't happen again and we may prosecute.

What form the pollution takes, determines the action taken to remove it. Oil is contained by booms or straw bales. Suction hoses or specially designed absorbent materials are used to draw the oil off the water. A strong pollutant, such as silage liquor, reduces oxygen levels in water. When this happens an aerator may be used to try to replace the oxygen.

Pollution control officers may have to warn, and keep informed, downstream users of river water, particularly if water supply, spray irrigation or cattle watering are involved.

We also set standards for sewage and trade effluent discharged to rivers which ensure they will not harm the river. Samples are regularly taken and analysed to make sure the standards are being met.

Pollution - how can you help? Some of the complaints of pollution are ill-founded, some trivial and others are serious and need urgent attention. Until we arrive at the scene we can't be sure which it is going to be. But we'd rather have 20 calls about a suspected pollution incident than none at all.

Weather conditions and time of day or night can sometimes make it difficult to trace a pollution incident back to its source. After you've contacted one of our pollution control offices you could help by getting a camera, and tracing the pollution back to its source, taking photographs as you go.

You can also help in the fight against pollution by remembering the following points:

DON'T put oil, petrol or garden chemicals down drains or into gutters;

DON'T throw rubbish into rivers or streams, however large or small;

DON'T allow any potentially polluting matter to escape into a watercourse.

DO ask us for advice if you are not sure how to dispose of a potential pollutant;

DO report any suspected pollution incident immediately;

DO tell us if you have a spillage of a potential pollutant.

REMEMBER – pollution is everyone's responsibility.

If you see any signs of water pollution contact one of our pollution control offices immediately. We're on call 24 hours a day.

Success Pollution is a serious problem but it can be beaten, as the River Trent and one of its tributaries, the River Tame, have shown.

Once little better than an open sewer in places, the River Trent is now recognised as one of the best fisheries in the country. Twenty years ago anglers might have hoped to catch small roach or gudgeon on the lower reaches of the river – but that was all. Now barbel, bream, chub and dace abound.

Salmon are also returning to the river and although they are few in number, anglers would never have dreamed of hooking this magnificent fish a few years ago. A healthy and wide-ranging fish population is a sign of a healthy river.

Crucial to the success in cleaning up the Trent has been the work on its major tributary, the River Tame.

If the Trent was little more than an open sewer, the Tame was literally an open sewer.

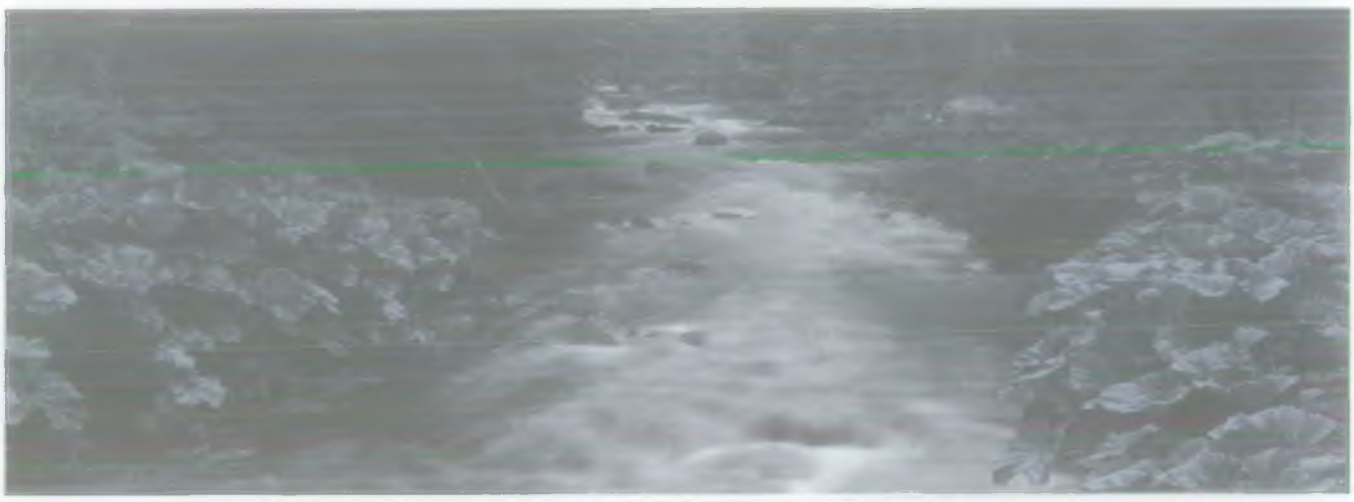
Flowing through the industrial West Midlands the river receives massive inputs of sewage and industrial effluent as well as large amounts of polluted run-off during wet weather.

Improvements in the quality of sewage effluent along with the construction of a purification lake has resulted in major improvements.

A coarse fishery has been established in the lower reaches of the river for the first time in more than 100 years.

But the story doesn't end here. Pollution control is a round-the-clock job and constant vigilance is essential if our rivers are to remain a source of life and pleasure for us all.

Remember: Pollution is everyone's responsibility. If you see any signs of water pollution contact the NRA's pollution control office immediately. We're on call 24 hours a day.



The NRA's Pollution Control Offices can be contacted 24 hours a day on the following telephone numbers:

SOLIHULL..... 021-711 2324
LICHFIELD.....(0543) 444141
NOTTINGHAM.....(0602) 455722
SHREWSBURY.....(0743) 272828
TEWKESBURY..... (0684) 850951

Headquarters: *Sapphire East, 550 Streetsbrook Road, Solihull, West Midlands B91 1QT*
Telephone: 021-711 2324

NRA

Severn-Trent Region

SHEEP DIPS AND POLLUTION

Sheep dip is highly toxic to fish and other aquatic life, birds, animals and wildlife. Therefore, it MUST be handled and disposed of with great care.

Only licenced dip concentrations should be used, instructions must be followed to the letter. Ensure only as much dip as is needed is prepared so there is no surplus to be disposed of. However, if there is any left over it should be returned to the supplier or taken away by a specialist contractor.

Remember!

The condition of the bath should be examined, a check made to make sure the drain back system is working properly and the drain hole found in older baths sealed.

Never allow the bath to overflow and position it well away from any river or stream. Freshly dipped sheep must also be kept away from any nearby watercourse.

Correct disposal of the used dip is vital. It should never be dumped into rivers or streams or groundwaters, and soakaways are unlikely to be suitable.

Dip can be put onto land but the site must be capable of absorbing it. As a general rule not more than 250 gallons (1,100 litres) should be spread per 0.25 ha. Don't allow livestock to graze after disposal. The land must take the liquid without run-off or the creation of puddles. It must not be on a steep gradient and gravel, coarse sand and peaty soils are unlikely to be suitable.

If there is no suitable land then the spent dip must be retained in tanks for disposal by expert contractors. Details are available from your Local Authority Waste Disposal Department.

Empty containers should never be re-used for any purpose. Containers should be cleaned when the dip is being prepared so that the rinsing liquid can be added to and form part of the diluted dip wash. After cleaning, containers should be punctured or crushed to make them unusable. Clean, perforated or crushed containers will be accepted at licensed disposal sites where they will be regarded as non-hazardous industrial waste. Most local authorities will collect on request but there may be a charge.

Offices

Our pollution control staff will be pleased to advise on these matters. Contact your local officer on one of the numbers listed overleaf:

NRA

National Rivers Authority

Severn-Trent Region

The NRA's Pollution Control Offices can be contacted 24 hours a day on the following telephone numbers:

SOLIHULL..... 021-711 2324
LICHFIELD.....(0543) 444141
NOTTINGHAM.....(0602) 455722
SHREWSBURY.....(0743) 272828
TEWKESBURY..... (0684) 850951

Headquarters: *Sapphire East, 550 Streetsbrook Road, Solihull, West Midlands B91 1QT*
Telephone: 021-711 2324

NRA

National Rivers Authority
Severn-Trent Region

Severn catchment below River Teme confluence including River Avon:
Lower Severn Area Office,
Riversmeet House, Newtown Industrial Estate,
Northway Lane, Tewkesbury GL20 7JG.
Telephone: (0684) 850951

Severn catchment down to and including River Teme confluence:
Upper Severn Area Office, Hafren House,
Shelton, Shrewsbury SY3 8BJ.
Telephone: (0743) 272828

Trent catchment down to and including River Dove confluence:
Upper Trent Area Office, Sentinel House,
Wellington Crescent, Fradley Park,
Lichfield WS13 8RR.
Telephone: (0543) 444141

Trent catchment below River Dove confluence:
Lower Trent Area Office, Trentside,
Scarrington Road, West Bridgford,
Nottingham NG2 5FA.
Telephone: (0602) 455722

Headquarters: *Sapphire East, 550 Streetsbrook Road, Solihull, West Midlands B91 1QT*
Telephone: 021-711 2324

NRA

Severn-Trent Region

Canals These are generally managed by British Waterways Board (BWB) and you must have a contract from them before you can take water from a canal. BWB will obtain a licence from us.

Groundwater You must have a consent from us to construct and test pump the borehole or well before we can issue a licence. Contact a drilling contractor for more information about the actual construction of a borehole.

In some cases a licence may be issued subject to a time limit or with the proviso that compensation discharges are made into a river or stream during low flows.

Groundwater abstraction may continue even after restrictions have been imposed on surface sources in the area.

The only sources unlikely to be restricted during long periods of dry weather are groundwater and off-stream reservoirs that have been filled when restrictions were not imposed.

Charges Licences for spray irrigation are charged at a rate based on the source, water quality and licensed quantity. These charges may be reduced by applying for one of the various forms of relief available.

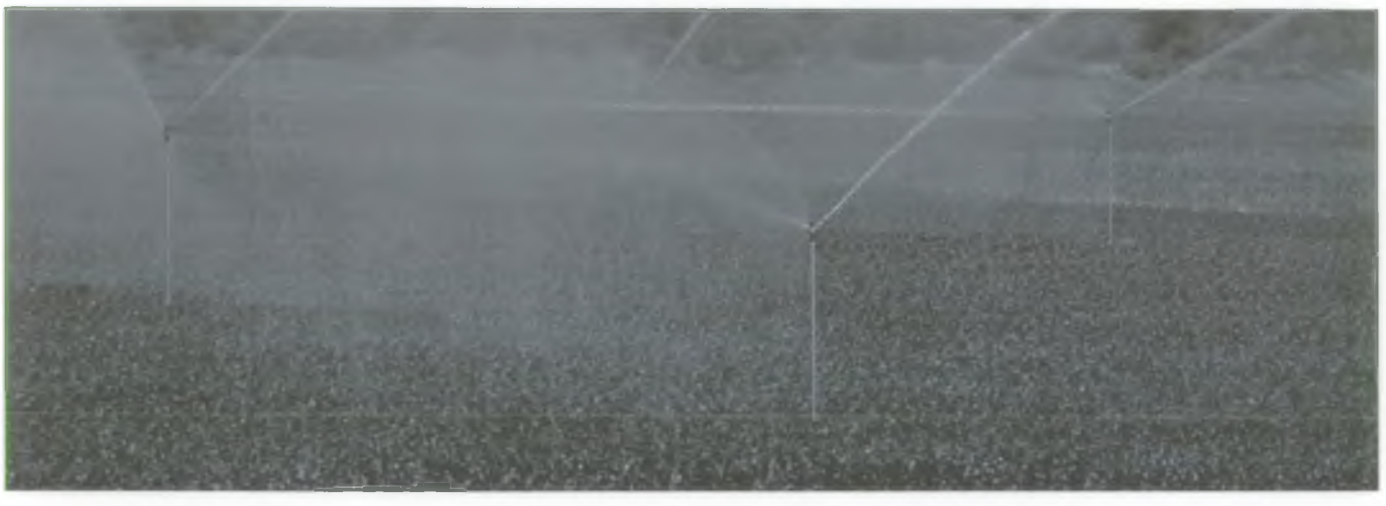
Measurement Measuring the amount of water taken is a condition of a licence so any scheme must allow for a suitable meter to be installed. Meter readings must be submitted to us and charges for the amount of water taken may be based on these readings.

The licence holder is responsible for the installation and maintenance of the meter. Our field staff conduct random inspections of both meters and records to ensure any special licence conditions are adhered to.

If the terms of a licence are not complied with we can prosecute.

Applications Our licence application forms are free, but the proposal must be advertised twice in a local newspaper and once in the London Gazette before a formal application is made. This allows interested parties time to inspect the application form and any other relevant documents.

For a licence application form or further information contact the relevant NRA office listed overleaf.



In dry summers spray irrigation can have a significant impact on river flows. Part of the National River Authority's role is to protect water resources from over-pumping. Careful thought and planning are essential to ensure water is available for everyone, so anyone who wants to take water from a river, canal, reservoir or borehole must have a licence to do so.

The licence will state:

1) where abstraction can take place
2) the land on which the water is to be used
3) how much water can be taken
4) how the water is to be taken e.g. by pump or gravity feed
5) how it is to be measured
6) any special conditions which may apply e.g.: when river flow falls below a certain level abstraction must stop.

How much water will I need? This will depend on the crop and the area to be irrigated. Specialist advice may be needed from the Agricultural Development Advisory Service (ADAS) of the Ministry of Agriculture, Fisheries and Food or other agricultural specialists. Once you know how much water you will need we can assess the availability of that amount.

Where can the water come from? Rivers, canals and reservoirs are surface water resources and wells and boreholes are groundwater resources. Spray irrigation water may come from any of these.

Rivers and streams These may include anything from a major river to a small drainage system. A licence to take water from here may be subject to a prescribed flow condition in order to maintain the flow and protect existing users. This means abstraction is limited to periods when the flow in the river or stream is above a set rate. This may be related to one of our gauging stations or to a local measuring weir installed by the user.

Reservoirs An off-stream reservoir can allow water to be taken from a source and stored for future use. This water may be used even after we have restricted abstraction from the original source.

On-stream reservoirs may provide another source but would be subject to the same prescribed flow condition as the watercourse unless expensive by-pass arrangements can be incorporated to maintain stream flows. A licence will be needed to obstruct or stop the flow and another to take water from the reservoirs.

SPRAY IRRIGATION

NRA

National Rivers Authority

The NRA's Pollution Control Offices can be contacted 24 hours a day on the following telephone numbers:

BIRMINGHAM 021-711 2324
LICHFIELD ..... (0543) 444141
NOTTINGHAM ..... (0602) 455722
SHREWSBURY ..... (0743) 272828
TEWKESBURY ..... (0684) 850951

Headquarters: *Sapphire East, 550 Streetsbrook Road, Solihull, West Midlands B91 1QT*
Telephone: 021-711 2324

NRA

National Rivers Authority
Severn-Trent Region

SLURRY AND DIRTY WATER DISPOSAL

Application of manures, slurries and dirty water to agricultural land can be the best and cheapest disposal option if done safely.

Site suitability depends largely on slope, soil type and water content. The main pollution risk is from surface run-off or passage through fissures or land drains.

Sites to be avoided:

1. Frozen, compacted or waterlogged land next to a watercourse.
2. Land with a steep slope and at field capacity or with heavy surface texture and also field capacity which is next to a watercourse.
3. Under-drained land next to a watercourse.
4. Land in close proximity to wells and boreholes.

Sites which represent a high risk should not be used for waste disposal.

Offices

For further advice contact your local NRA pollution control office listed overleaf or the ADAS Drainage Advisory Service.

NRA

National Rivers Authority

Severn-Trent Region

SLURRY STORAGE

Many pollutions occur because of inadequate design, construction, maintenance or poor operating standards.

A slurry store should be designed to collect, and contain, slurry safely for a specific storage period.

The Control of Pollution (Silage, Slurry and Agricultural Fuel Oil) Regulations 1990 lays down certain requirements for new, extended or substantially reconstructed stores and reception pits.

The main requirements include:

1. No part of the store should be sited within 10 metres of a watercourse.
2. Floors should be impervious.
3. Walls and floors should be capable of withstanding specified loads (BS 5502).
4. The store should have an anticipated 20 year life expectancy.
5. The store should be sized to contain at least four months storage.
6. The store should have a minimum specified free board area.
7. There is a requirement to notify the NRA, in writing, at least 14 days before use.

Offices

For further details see the Control of Pollution Regulations 1990. Your local pollution control office, listed overleaf, is happy to give advice on all aspects of water pollution prevention.

NRA

National Rivers Authority

Severn-Trent Region

The NRA's Pollution Control Offices can be contacted 24 hours a day on the following telephone numbers:

BIRMINGHAM..... 021-711 2324
LICHFIELD.....(0543) 444141
NOTTINGHAM ..... (0602) 455722
SHREWSBURY..... (0743) 272828
TEWKESBURY..... (0684) 850951

Headquarters: *Sapphire East, 550 Streetsbrook Road, Solihull, West Midlands B91 1QT*
Telephone: 021-711 2324

NRA

National Rivers Authority
Severn-Trent Region

Centred on the Midlands, the Severn-Trent Region is one of ten regional units of the NRA. The second largest, both in size and population, we cover more than 8,000 square miles (21,600 sq kms) containing nearly 4,000 miles of rivers and watercourses and with a population of 8.25 million.

ENVIRONMENT AGENCY

HEAD OFFICE

Rio House, Waterside Drive,
Aztec West, Almondsbury,
Bristol BS32 4UD

NRA

National Rivers Authority

NRA

Severn-Trent Region