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ABSTRACT

This guide for schools with swimming pools offers advice concerning appropriate training for pool managers, the importance of water quality and testing, safety in the handling of chemicals, maintenance and cleaning requirements, pool security, and health concerns. The guide covers both indoor and outdoor pools, explains some technical terms, provides a range of desirable pool temperatures, and includes a swimming pool management checklist. (GR)

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Managing school facilities

Guide 2

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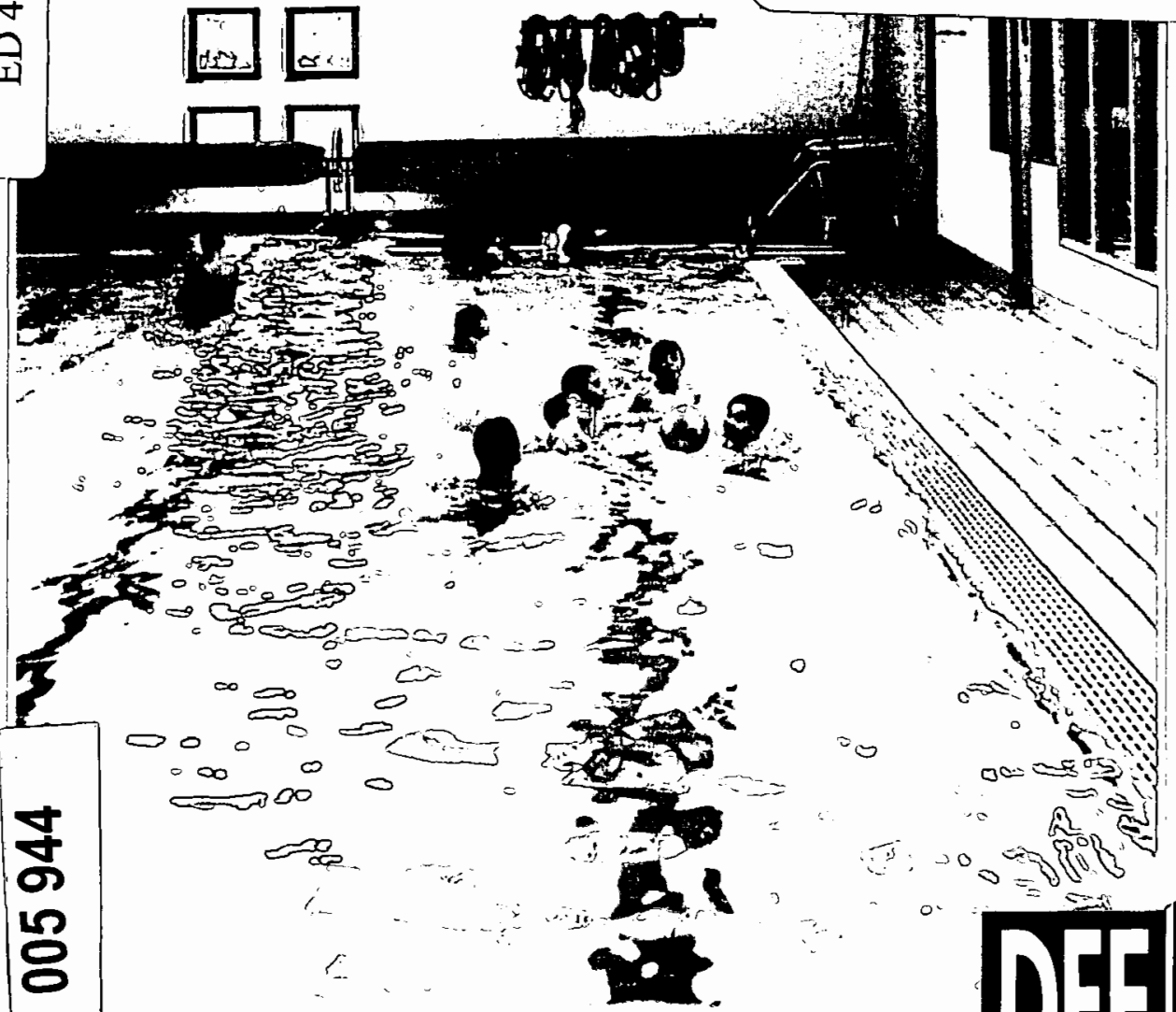

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Swimming pools

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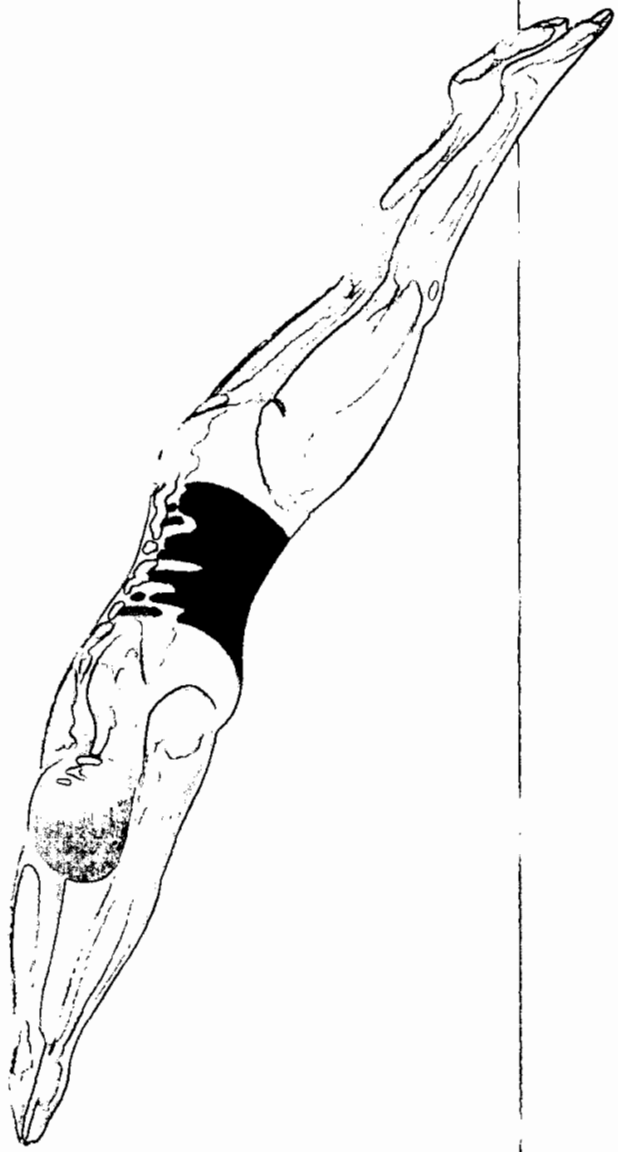

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Swimming pools

For a school a swimming pool represents a major financial investment. A swimming pool offers a valuable development opportunity for pupils and also a desirable recreational facility which may be shared with the community. Most head teachers and governors generally realise the importance of ensuring that more people use these pools. However, the presence of a swimming pool entails certain responsibilities, including that of knowing the operational and specialist plant maintenance requirements.

Responsibility for the management and operation of swimming pools varies from school to school, depending on status and arrangements under Local Management of Schools. There may also be cases where the responsibility is shared with a third party, such as a district council.

However, all those with some responsibility for swimming pools should possess a level of awareness and knowledge which will ensure their continued provision and safe operation. It is with this in mind that this guidance has been prepared.

General responsibilities

A school should always have a clearly identified swimming pool manager. The pool manager can be a teacher, a caretaker or a leader of a major pool user-group, and should have received appropriate training. The manager of a swimming pool has the responsibility for ensuring the safety of users of the pool. Under the Health and Safety Management Regulations 1992 employers must ensure that risk assessments are carried out in connection with all activities involving the use of the pool.

It is for this reason that the school pool manager must be fully aware of the current guidance concerning the operation of swimming pools. An essential consideration is the correct operation and maintenance of the pool water treatment plant, and achieving acceptable water quality.

This document is orientated principally towards a typical indoor school/community use pool with a short note on outdoor pools. Your pool may not be to this standard, but the general principles contained here are to some extent relevant to all swimming pools.

Written operating procedures

Detailed operating procedures should be prepared which provide a description of the procedures and arrangements for how the swimming pool is to be operated to ensure users' safety. It should include both a normal operating plan and an emergency action plan.

The Normal Operating Plan should cover

- regular inspection of the swimming pool, plant and structure for safety
- controlling access to the pool
- controlling maximum admissions
- competence, training and deployment of lifeguards
- the standards of user behaviour
- conditions of hire to outside organisations
- supervision requirements for specialised activities
- use of pool covers
- first aid arrangements
- emergency alarm procedures.

The Emergency Action Plan should cover the action to be taken in the event of an emergency eg:

- overcrowding & disorderly behaviour
- lack of water clarity.
- evacuation of pools for various reasons like lighting failure
- structural failure
- emission of toxic gasses
- serious injury to a bather or a drowning.
- bomb threat

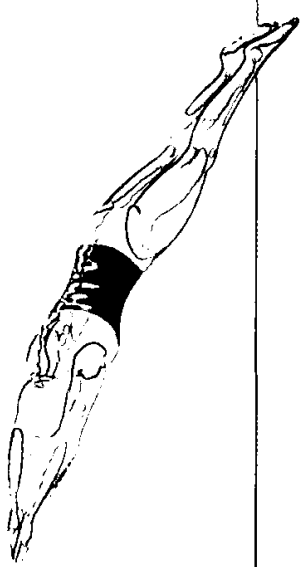
Security

It should be possible to secure the swimming pool from unauthorised use through the provision of access doors that may be locked.

A swimming pool should incorporate a system through which assistance may be called should there be an emergency in the pool. Such a system may incorporate an arrangement of pool-side alarm activation points which sound alarms in the pool hall and in other appropriate locations.

Temperatures

Whilst a higher water temperature may be popular with some users, the pool manager needs to strike a balance between the demand for higher temperatures and operational problems. The following are some of the main disadvantages of higher water temperatures:



- Micro-organisms multiply faster, which in turn leads to increased use of chemical disinfectants and higher costs.
- Bathers get hotter and sweat more. This not only limits their swimming it also pollutes the water and increases the load on the pool's chemical disinfection system.
- Energy costs increase as water is heated to a higher temperature.
- The moisture content of the air in the pool building rises; This can result in condensation and subsequent damage to walls, roof, etc. through corrosion.
- Dissolved gases become less soluble, so there may be more bad smells (chloramine) and even potentially harmful gases (haloforms).

Taking all this into account the following conservative range of maximum temperatures for different sorts of bathing is recommended:

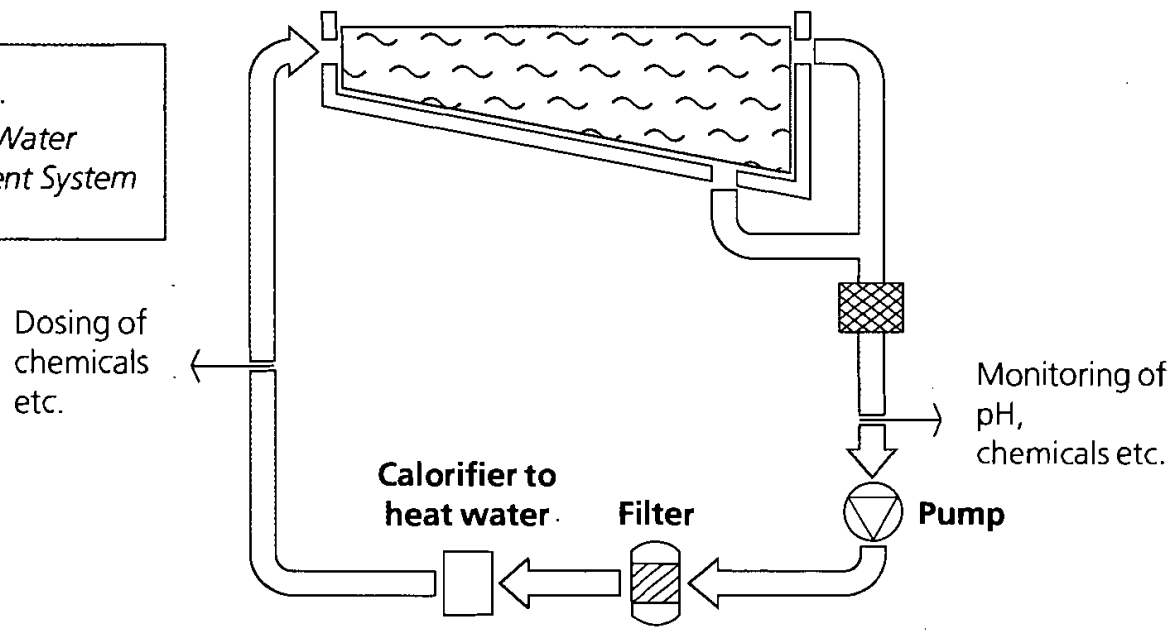
Conventional, main pool	**28° C**
Leisure pools	**29° C**
Teaching	**29° C**
Diving	**28° C**
Competition and fitness swimming	**27° C**

As a general rule swimming pool air temperature should be 1° C higher than water temperature.

Water quality

It is important that high water quality is maintained in the swimming pool at all times. This will not only reduce the risk of infections but also make swimming a pleasurable experience for most bathers. All pools will try and achieve good water quality using filters, disinfection chemicals, dilution etc. Figure 1 shows a simple water treatment arrangement. Some of the main treatment methods are considered below.

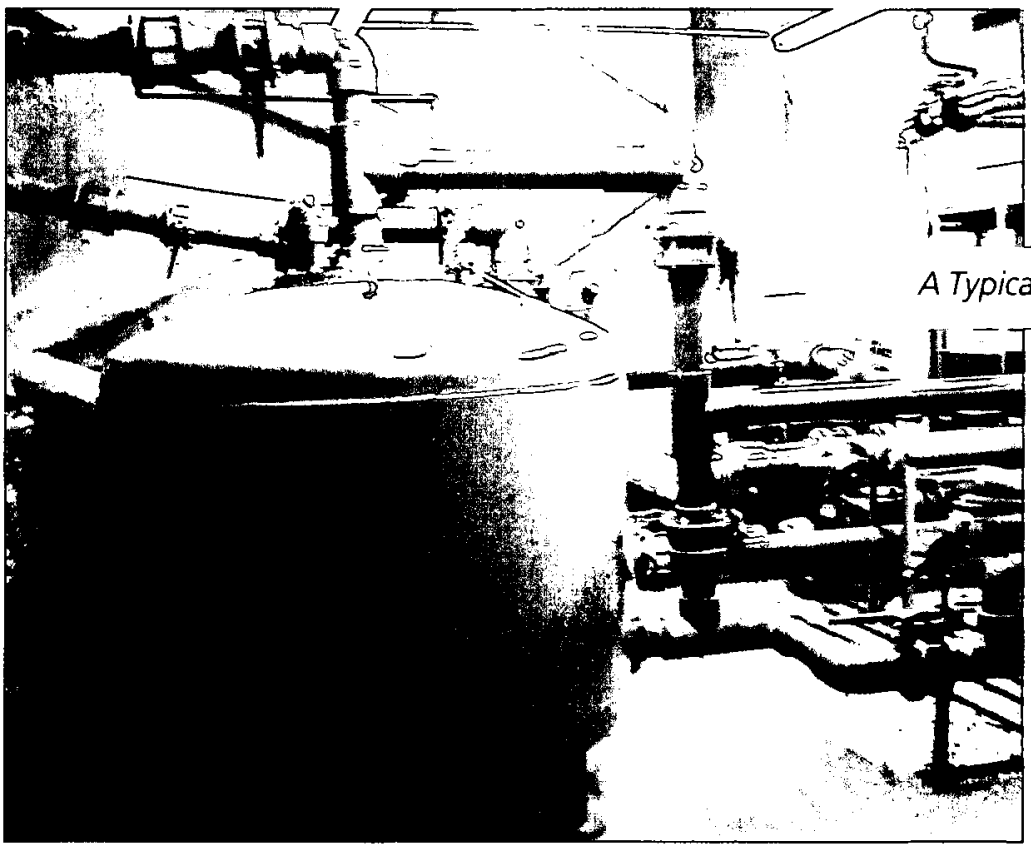
Figure 1. Typical Water Treatment System



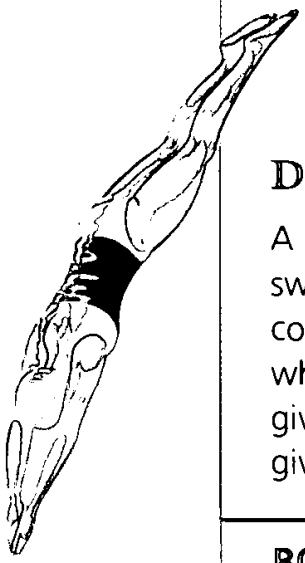
The school pool water treatment plant will have been designed for a specified number of bathers in a given period. This figure must be known before considering extending the use of the swimming pool. The design of the water treatment might be so finely balanced that only a slight variation to the style of operation may affect the water quality.

Filtration

Filters are the heart of the pool water treatment and the filter system should normally be operated continuously. Filters should be maintained in a good condition by frequent backwashing and regular inspection. Conventional sand filters need backwashing at least once a week and much more frequently in a busy pool. High rate and pre-coat filters require frequent, sometimes daily backwashing as specified in the manufacturer's guidance.



A Typical Sand Filter



Disinfection

A chemical disinfectant of some type is added to the swimming pool water to ensure that any harmful contamination is either destroyed or reduced to a level which is not normally harmful to the health of bathers. Box 1 gives a number of disinfectants that may be used and also gives appropriate tests and desirable concentration levels.

BOX 1

Chemical Disinfectants

The following are the chemicals commonly used for disinfecting pool water. Also given below aree normal tests and concentration levels.

Sodium hypochlorite
Calcium hypochlorite

Test for

Free chlorine	1.0 - 3.0mg/litre
Combined chlorine	less than 1.0mg/litre, not greater than 50% of the free chlorine result.

Sodium dichloroisocyanurate dihydrate
Trichloroisocyanuric acid

Test for

Free chlorine	1.5 - 5mg/litre
Combined chlorine	not greater than 50% of the Free Chlorine result.
Cyanuric acid	Not more than 200 mg/litre. Test once a week.

Bromochlorodimethylhydantoin

Test for

Total Active bromine (DPD No 1)	4.0 - 6.0 mg/litre
Dimethylhydantoin	not more than 200mg/litre - no simple test. Dilution at the rate of 30 litres per day per bather should ensure that this level is not exceeded.

Dilution

Any disinfection process will add chemical by-products to a pool which overtime will build up and may be harmful to bathers. In many pools backwashing of filters can reduce this form of contamination, when sufficient water is removed from the main body of the pool and replaced with fresh water. Where this is not the case and combined chlorine and/or Total Dissolved Solids (TDS) levels exceed stated standards (1,500 mg/litre for TDS) it may be necessary to add fresh water to the pool at a rate of up to 30 litres per bather per day.

Turnover period

This is the time taken for water in the pool, to be removed from the pool, passed through the water treatment plant and returned to the pool. This is an important measure, as it shows the ability of the pool treatment plant to deal effectively with the proposed bathing capacity. The current standard for new public pools is a turnover period of about 2 hours and in general the less water contained in the pool the faster the turnover required.

Some school swimming pool water treatment plants may have been designed at a time when a 4 hour turnover period was considered to be adequate. A school's pool water treatment plant may also have been designed on the basis that the bathing load will normally be constant and that the pool will have a short period of rest as one class of children leaves the pool and before another enters and that sudden variations in bather load will not normally be a feature of the pool operation.

In such school pools where the bathing load is restricted, a turnover period of 2.5 to 3 hours can give satisfactory results.

However, it is recommended that for these pools the water treatment process is run continuously, ie. 24 hours a day, 7 days a week, during the period when the pool is in regular use.

It is important that for all pools the turnover period is calculated and an assessment made as to whether this is considered adequate to deal with current usage and if any alterations are needed in the usage of the pool.

Water testing

The testing of the swimming pool water should be a routine part of the duties of a pool operator. The following is a simple recommended testing routine:

○ water clarity ○ disinfectant level ○ pH (see box 2) ○ water temperature ○ air temperature	every 2-3 hours
○ alkalinity ○ cyanuric acid (if necessary)	once a week

It is very important that an accurate record is kept of every test carried out as this can provide valuable information should a difficulty arise. Such records have been requested for examination in the investigation of accidents. The records should be retained for at least 5 years.

BOX 2

pH pH is a measure of whether pool water is acidic or alkaline and is measured on a 14 point logarithmic scale with 7 being neutral. The pH of the swimming pool water can affect the effectiveness of the disinfectant and so it is important to maintain this between 7.2 and 7.8. If the pH goes outside this range the pool should be taken out of use at once and remedial action should be taken.

Water clarity

The clarity of the swimming pool water should be maintained to a level which will ensure the safety of bathers. It is vitally important that the bottom of the pool is always visible so that a person coming to rest at the deepest point of the pool is seen. It should be possible to see the bottom of the pool clearly from any position on the pool side when the pool is in use.

The pool should be closed whenever this standard fails to be achieved.

Draining and filling of pools

It may become necessary to drain a pool to carry out essential maintenance. If so, steps should be taken to minimise the possibility of damage to the structure or surface finish due to thermal shock or balanced loading. Pools with PVC or GRP liners should be emptied in accordance with the installer's instructions.

Filling or draining a pool should be done, slowly and continuously. It takes 2 to 3 days to fill or empty a standard 25 metre pool. To avoid thermal shock prior to refilling an empty pool, the pool building should be cooled to as close to the temperature of the incoming water as practicable.

Energy conservation

Pools use a lot of energy. For many schools with pools about 25% of their expenditure on energy is accounted for by the pool. Hence it is important that heads and governors take suitable steps to reduce energy usage in pools.

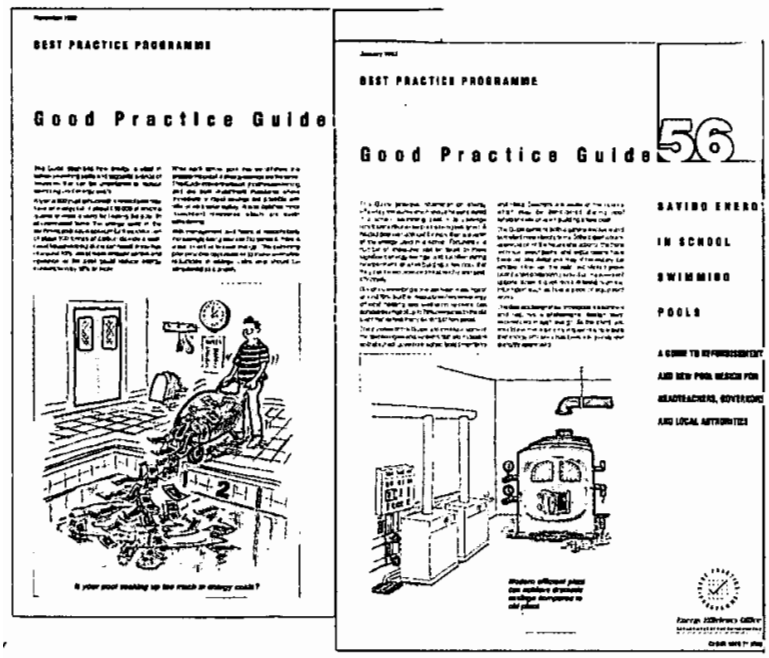
Use pool covers to save energy

Many school pools are provided with pool covers, but these may not be used on a continuous basis. The practices concerning the use of pool covers should be examined and the condition of the cover should be assessed. A cover which allows water to be present on its surface is not as effective as one that does not. In order to gauge the effectiveness of the pool cover, the water temperature should be taken just after the cover is placed on the pool at night and just before it is removed in the morning.

Pool covers also serve to protect the pool hall structure from the adverse effects of water evaporation and condensation, which is normally high overnight when the pool hall air temperature falls. Swimming pools should be adequately ventilated at all times to avoid condensation on walls and roofs.

Also ensure that the pool is being operated at an appropriate temperature. Higher water temperature means higher energy consumption.

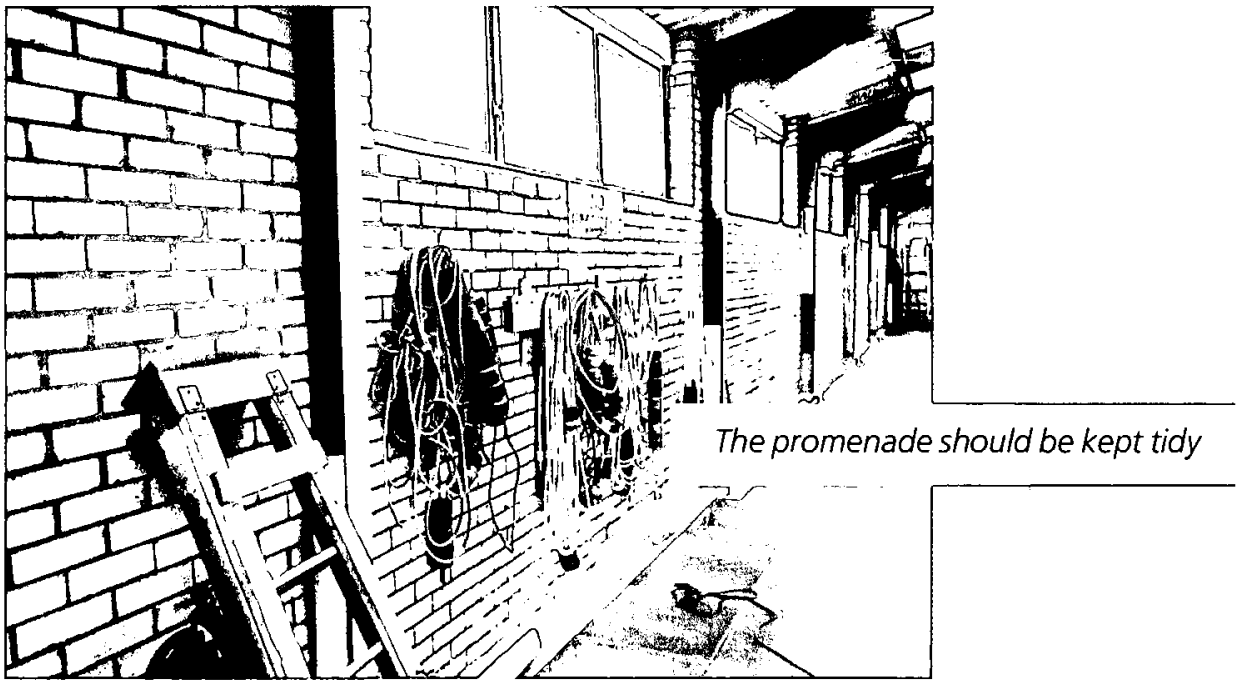
DFE has worked with the Energy Efficiency Office and supported the publication of two broadsheets on saving energy in schools. These are available free from BRECSU (see 'Further Reading' for details).



Cleaning

The presentation of a generally clean and tidy swimming pool is one reason for following an appropriate cleaning programme. However, good hygiene is also most important to minimise the presence of harmful bacteria and other substances which might pollute the water.

A substantial amount of any contamination introduced will collect on the water surface. The presence of an effective surface water removal system, a skimmer or scum channel arrangement should assist in reducing this problem; but the system should be inspected and checked for effectiveness weekly. Any solid floating debris should be removed from the pool using a net or scoop as soon as it is observed.



The promenade should be kept tidy

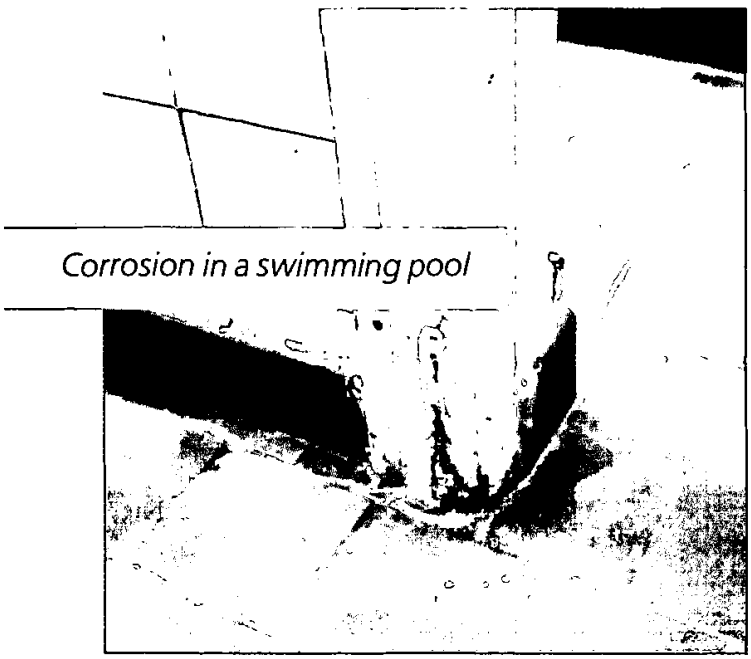
Pool promenades should be kept tidy and clear of any obstacles and unnecessary furniture. The promenade should also be kept scrupulously clean and outdoor shoes strictly excluded from the pool surround. Where this is not practicable, consideration should be given to increasing the frequency at which the pool promenade is cleaned. The choice of the cleaning agent must be compatible with the pool water chemistry. General purpose cleaning chemicals must never be used on pool surrounds.

When cleaning the pool promenade it is necessary to be aware of how the drainage system is interconnected. In some installations the pool promenade drains may connect to the swimming pool circulation system. In such circumstances every effort must be made to avoid contamination of the pool.

Maintenance

It is necessary to consider the maintenance of the school swimming pool from two perspectives - preventative and day-to-day.

Due to the complexity of swimming pools, it is recommended that a maintenance contract is entered into with a specialist contractor. The arrangement should provide for regular scheduled maintenance and at least four formal inspections of the swimming pool each year; one every 3 months. In addition the contractor should be on 24 hour call and be required to respond and deal with problems as they arise. The objective of the maintenance contract should be to ensure the continued uninterrupted operation of the swimming pool. The selected contractor should be a member of the Swimming Pool and Allied Trades Association (SPATA) and/or the Institute of Swimming Pool Engineers.



Corrosion in a swimming pool

Day-to-day maintenance will be required and a suitably trained and qualified swimming pool plant operator should be capable of dealing with the majority of minor problems as they arise. It would be in the interests of the head teacher and governors to ensure that the person responsible for the day-to-day operation of the swimming pool is capable of undertaking as much of the minor maintenance of the swimming pool and its plant as possible.

Swimming pool structures, especially roofs should be examined at regular intervals. Visual examination should be carried out every 6 months and a full survey every 3 years. Some metals and woods can either corrode or rot, respectively, in the swimming pool atmosphere. This in turn could weaken the structure.

Storage and handling of chemicals

The precise requirements to be followed by pool operators in using pool chemicals are too detailed for inclusion here but the Control of Substances Hazardous to Health (COSHH) regulations on the use of chemicals must be observed. Manufacturers' instructions must also be strictly followed. The following are some general guidelines:

1. Adequate storage should be provided, that is dry and secure and ensures good separation of chemicals and no storage above head height.
2. When handling chemicals, operators should wear appropriate protective equipment - gloves, eye protection, wellingtons, aprons, and perhaps respiratory protection.
3. NEVER MIX CHEMICALS. Hypochlorite coming into contact with an acid will produce exceedingly dangerous chlorine gas. Also never mix chemical tablets from different manufacturers.
4. Do not hand-dose chemicals directly into a pool unless absolutely necessary, and never when there are bathers present.
5. Apply chemicals in small, frequent doses: do not try to adjust chemical balance in one large application.
6. Dilute chemicals where appropriate. ALWAYS add the chemicals to water and NEVER water to chemicals.
7. Do not overstock chemicals: Some will deteriorate in a short time eg. a few months for Sodium Hypochlorite. Safely dispose of unused chemicals. The law relating to waste disposal applies.

Training and qualifications

Head teachers and governors will appreciate the responsibility placed upon them through the presence of a swimming pool. The person with day to day responsibility should be trained and competent to operate the pool. Standards of operation have changed in recent years and it may be that individuals who have attended training courses in the past are not conversant with current thinking and good practice.

Training can sometimes be provided from local authority specialist support services. Where this is not available the Institute of Baths and Recreation Management (IBRM), a national professional body and educational charity, has established the National Small Pool Operators Certificate. This qualification offers the operator of a school pool the necessary, up to date information, which is required to ensure the correct and safe operation of a school pool.

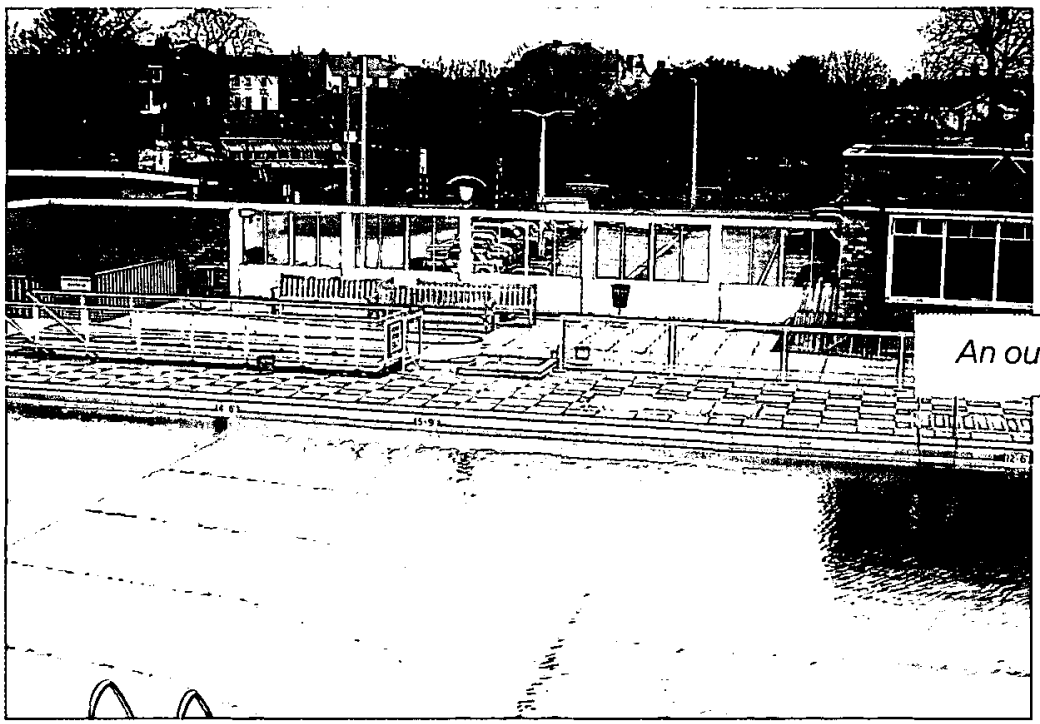
Head teachers and governors should consider carefully the current qualifications of their school pool manager and operators and, if necessary, take steps to ensure that they receive the necessary training.

Seasonal pools

In general the guidance given in this document is equally applicable to outdoor pools. There are, however, differences in the maintenance programme particularly when the pool is not used during the winter. A good winter preparation programme would prevent damage to the pool shell caused by hydrostatic pressure, rust and general deterioration and also minimises the opportunities for vandalism and prevents accidents.

Preventing deterioration and freezing

Hydrostatic pressure from freezing water in a pool or pipes is a major concern in sub-zero conditions. For large pools and small pools that are not subject to vandalism and which have good security, water should be left in the pools. Covering the pool with a suitable pool cover and maintaining the water circulation at a low rate will minimise the effects of freezing.



An outdoor pool

Where a pool is left filled without a cover, then logs and/or slightly weighted 5 litre plastic bottles strung across the pool should be left on the surface. These will absorb pressure from ice formation.

An empty pool is subject to external pressure where there is a high water table and should be fitted with drain valves to relieve this form of pressure. Cracking of the pool shell and underground pipe drainage are very costly to repair. Serious consideration must be given to how these problems will be prevented where it is found necessary to drain a pool.

All water lines to unheated showers, toilets etc should be drained if freezing is a possibility.

Security and accidents

The pool manager is responsible for preventing easy unauthorised access to the pool at all times including the closed season. Providing a pool cover is insufficient action to prevent accidental drowning. For outdoor pools good security and regular, frequent inspections are essential and such pools should at least be securely fenced.

Programming of the pool usage

The programming of the swimming pool will determine how effectively this major capital asset is utilised. Sports Council studies suggest that school pools are not utilised to their fullest extent and that much could be done to improve this.

Head teachers and governors can undertake a detailed study of the actual usage made of the school swimming pool. This study should attempt to identify the precise numbers of people making use of the pool every hour of each day throughout the different weeks of the year. Where possible actual head counts should be taken as personal perceptions of what is happening are frequently far from accurate.

Once an accurate picture has been constructed, consideration may be given to how best to further utilise the swimming pool. The IBRM may be able to assist in providing detailed guidance in this respect.

Health concerns

In a well managed swimming pool with good water quality and strict disinfection policy at all times there is minimal risk of infection to the bathers.

A common complaint of eye irritation in pools is due to presence of urea in the pool water. It is known that urination, sometimes involuntary, does take place in swimming pools. Although this does not give rise to any infection risks it does increase the chloramine levels and this in turn causes eye irritation. An education programme of encouraging children to use toilets and have a shower BEFORE entering the pool would greatly improve water quality and also reduce chemical usage.

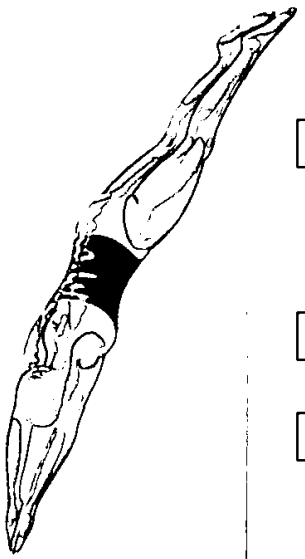
Further guidance

School head teachers and governors who wish to seek independent advice concerning the operation of their school pool or require further information on any topics covered by this guide should contact IBRM.

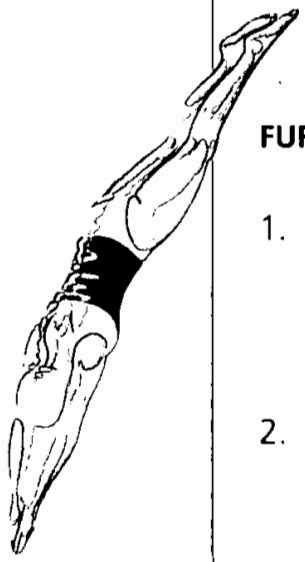
Some Local Authorities have specialist technical units which can advise on water treatment, maintenance needs, etc. Help can also be provided by suitably qualified consultants.

SWIMMING POOLS MANAGEMENT CHECKLIST

- [ ] Make sure your pool manager has received recent appropriate training.
- [ ] Carry out a risk assessment for pool use. Strictly follow safety procedures (see Safety in Swimming Pools publication from the Sports Council).
- [ ] Ensure lifeguards and swimming teachers are qualified to the Royal Life Saving Society standards or hold an Amateur Swimming Association Lifesaving certificate.



- [ ] Calculate the Turnover Period and Maximum Bather Loads for your pool to help you in planning usage.
- [ ] Test the pool water everyday before the pool is first used and then at regular intervals during the day.
- [ ] Operate the pool at the correct temperature (to save energy).
- [ ] Never mix chemicals or add chemicals directly to the pool when bathers are present.
- [ ] Backwash sand filters at least once a week.
- [ ] Encourage users to shower before entering the pool.



FURTHER READING

1. *Safety in Swimming Pools,* The Health and Safety Executive and The Sports Council, 1989, ISBN 0 906577 83 7, Price £5.50 from The Sports Council.
2. *The treatment and quality of swimming pool water*, Department of The Environment, National Water Council, HMSO, ISBN 0 11 751757 7. £4.60
3. *SPATA Standards for Swimming Pools* available from SPATA (see Useful addresses)
4. *Saving Energy in School Swimming Pools* – Good Practice Guides 55 & 56. Available FREE from Building Research Establishment. (Telephone number 0923 664258)

USEFUL ADDRESSES

1. The Institute of Baths and Recreation Management
   Giffard House
   36/38 Sherrard Street
   Melton Mowbray
   Leicestershire LE13 1XJ
   Tel : 0664 65531
   Fax : 0664 501155

2. Pool Water Treatment Advisory Group
   c/o Brian Guthrie
   Field House
   Thrandeston
   Near Diss
   Norfolk IP21 4BU

3. Swimming Pool & Allied Trades Association (SPATA)
   SPATA House
   Junction Road
   Andover
   Hants SP10 3QT
   Tel : 0264 356210
   Fax : 0264 332628

4. Institute of Swimming Pool Engineers (ISPE)
   94 Morley Grove
   Harlow
   Essex CM20 1ED
   Tel : 0279 626364
   Fax : 0279 626300

5. The Sports Council
   16 Upper Woburn Place
   London WC1 OQP
   Tel : 071 388 1277
   Fax : 071 388 5740

6. Institution of Environmental Health Officers
   Chadwick Court
   15 Hatfields
   London SE1 8DJ
   Tel : 071 928 6006
   Fax : 071 928 0353

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For schools that have them, swimming pools offer valuable development opportunity for pupils and also a recreational facility that can be shared with the community. However, presence of a swimming pool also entails certain responsibilities.

This Guide No. 2 in the series, aimed at headteachers and governors of schools with swimming pools, offers simple guidance on some of the topics including:

- need of appropriate training for pool manager
- importance of water quality and testing
- safety in handling of chemicals
- maintenance and cleaning requirements

The guide covers both indoor and outdoor pools and also explains some technical terms and gives a range of desirable pool temperatures.

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