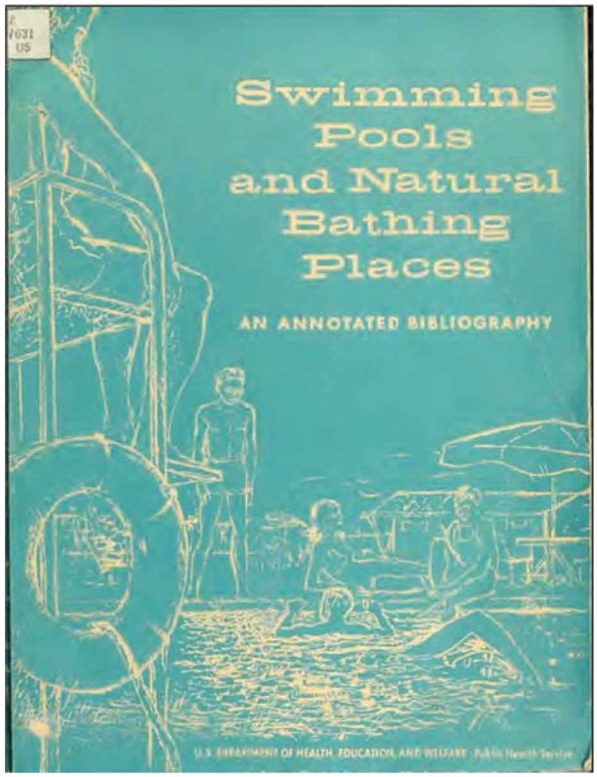
Swimming
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Swimming Pools and Natural Bathing Places

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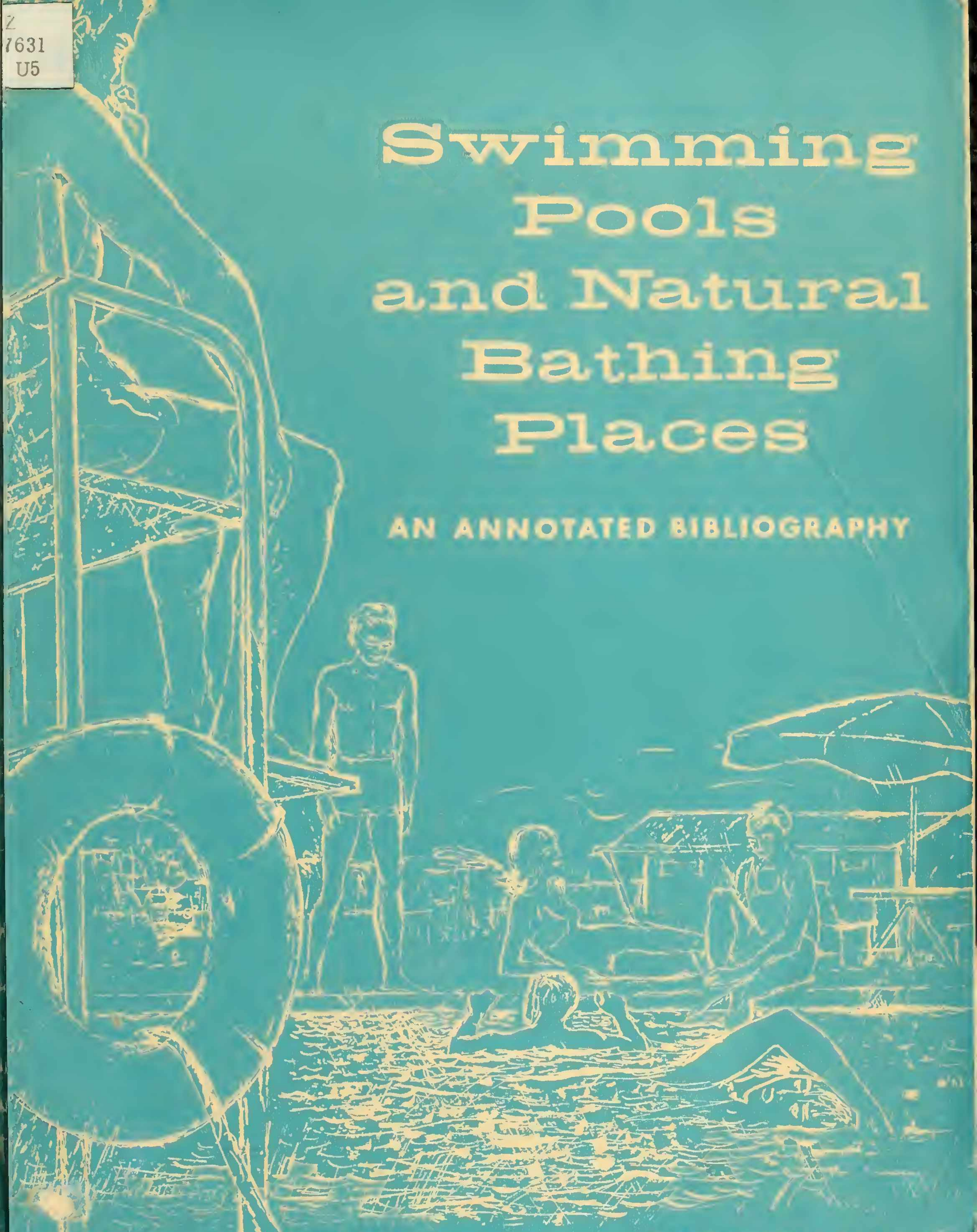

U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE · Public Health Service

Swimming Pools

and

Natural Bathing Places

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1957-1966

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service
Bureau of Disease Prevention and Environmental Control
National Center for Urban and Industrial Health
Cincinnati, Ohio

Public Health Service Publication No. 1586

For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 — Price 35 cents

CONTENTS

PREFACE

Swimming continues to be one of the most popular of aquatic outdoor activities for today's physical-fitness and recreation-minded population. This is reflected in the steady increase of swimming pool construction which in 1964 was at a rate of 80,000 pools annually.

Public health officials have been concerned with sanitation and safety problems involving swimming and bathing. The construction and operation of swimming pools and outdoor bathing places should provide an environment of safe water and attractive facilities for adequate protection against disease transmission and to prevent accidents.

This bibliography is intended for use by health and recreation authorities and others responsible for the construction, operation, and maintenance of swimming pools and natural bathing places. This initial publication covers the 1957–66 period. Plans are to update the series at 2-year intervals.

I. SWIMMING POOLS

A. DISEASE AND WATER QUALITY

Amies, C. R.

1. The Problem of Surface Film on Swimming Pool Water. *Swimming Pool Age,* 31:11:62, November 1957.

The concept of pollution from surface films was studied experimentally in order to assess its importance as a practical problem. It was found that surface water contained considerably more organisms than the same volume of water collected at a depth of one foot. The organisms present on the surface were predominantly staphlycocci and viridans streptococci with very few coliforms while results of samples taken below the surface were just the opposite.

Clark, Harold F.; and Kabler, Paul W.

2. Reevaluation of the Significance of the Coliform Bacteria. *Journal, American Water Works Association,* 56:7:931, July 1964.

The intended water use should determine the technical procedures used in bacteriological examination of the waters. Criteria are suggested for interpreting the significance of the various members of the coliform group in the investigation of water pollution. The scientific basis for the use of the coliform groups as pollution indicators is reviewed and the various methods used in interpreting coliform data are discussed.

Cleere, Roy L.

3. Resume of Swimming Pool Granuloma. *The Sanitarian.* 23:2:105, September–October 1960.

Reports the clinical features and laboratory findings of 262 cases of granulomatous lesions of the skin. All cases gave a history of swimming in a warm mineral water pool in Glenwood Springs, Colo. The construction of the draw and fill pool is outlined. It is pointed out that due to the rough surface of the walls the pool cannot be completely drained thereby providing a habitat for the growth of bacteria.

Cleere, Roy L.; Mollohan, Cecil S.; and Romer, Mary S.

4. The Mystery of the Swimming Pool. *Rocky Mountain Medical Journal,* 58:3:31, March 1961.

Public health authorities investigated an epidemic of 262 cases of "sore elbow" occurring in bathers in the Glenwood Springs, Colo. pool. The pool is a nonchlorinated, fill-and-draw type pool with rough concrete and rock walls. *Mycrobacterium balnei,* isolated from the pool and the lesions, was indicated as the causative organism.

Dick, Elliot C.; Shull, Ivan F.; and Armstrong, Alan S.

5. Surface-Subsurface Distribution of Bacteria in Swimming Pools — Field Studies. *American Journal of Public Health,* 50:5:689, May 1960.

Seven outdoor swimming pools, located in Kansas City, Kans., Topeka, Kans., or the environs of these two cities were sampled without warning during the summer of 1958 to determine surface-subsurface distribution of bacteria. Two pools were typical fill and draw pools which were hand chlorinated with hypochlorites; the remainder of the pools examined were recirculating pools with different filtration and recirculation systems. Although the surface-subsurface sampling results indicated that there may be concentration of bacteria in the surface film, the concentration does not appear to be alarming. Almost all surface or subsurface counts fell within the standards set by the American Public Health Association for swimming pools to be labeled as "fair."

Farrington, Joseph; Murray, Nelson A.; and Jeffries, Mildred

6. Swimming Pool Granuloma, *Journal of the Florida Medical Association,* 47:4:400, October 1960.

Reviews some medical literature showing that granuloma which causes skin lesions has been linked to abrasive accidents in swimming pools. Four cases of granuloma occurring in northern Florida are reported in which each case had received an abrasion at the site of the lesions while swimming.

Favero, Martin S.; Drake, Charles H.; and Randall, Georganne B.

7. Use of Staphylococci as Indicators of Swimming Pool Pollution. *Public Health Reports,* 79:1:61, January 1964.

The predominant bacterial flora of 12 public, university and private swimming pools were studied for a 2-year period to determine the validity of present standards for measuring the water's sanitary quality. The results indicated that present standards based on the presence of the coliform bacteria and the total count are inadequate. It is suggested that the staphylococci be adopted as indicators of pollution in swimming pools with an allowable maximum of less than 100 staphylococci per 100 ml. of water.

Greenberg, Arnold E.; and Kupka, Edward

8. SWIMMING POOL INJURIES, MYCOBACTERIA, AND TUBERCULOSIS-LIKE DISEASE. *Public Health Reports*, 72:10:902, October 1957.

Reports studies that indicate the possibility that abrasive accidents in swimming pools may lead to inoculation lupus vulgaris, granulomatous tuberculosis lesions, or other tuberculosis-like lesions. The authors conclude that since the swimming pool appears to be a factor in disease transmission, smooth-surface walls and breakpoint chlorination will prove effective in curtailing epidemics.

Kelly, Sally; and Sanderson, Wallace W.

9. ENTERIC VIRUSES IN WADING POOLS. *Public Health Reports*, 76:199, March 1961.

The isolation of viruses from urban wading pools showing no chlorine residual indicated that a potential health hazard may exist. The failure to detect viruses in chlorinated swimming pools sampled during the same period and in the same area suggested that chlorination of wading pools is needed.

Mallman, W. L.

10. COCCI TEST FOR DETECTING MOUTH AND NOSE POLLUTION OF SWIMMING POOL WATER. *American Journal of Public Health*, 52:12:2001, December 1962.

Fourteen school swimming pools were tested for the presence of cocci from September 28, 1960, to March 1, 1961. Intensive spot examination of swimming pool water during heavy bathing loads yielded varying numbers of cocci per sample. Pollution appeared to be in pockets of contamination that disappeared as a result of dissemination and destruction by chlorine. The relation to spread of disease was not studied.

McLean, Donald M.

11. CONTAMINATION OF WATER BY VIRUSES. *Journal, American Water Works Association*, 56:5:585, May 1964.

Reviews studies of chemical, bacteria, and virus content of swimming pools, wading pools, lake shores, and drinking water supplies. In most cases no viruses were detected in the water.

12. INFECTION HAZARDS IN SWIMMING POOLS. *Pediatrics*, 31:5:811, May 1963.

Studies of the microbiological and chemical characteristics of outdoor public swimming pools in Toronto, Canada, during three successive summers indicate that it is unlikely that adequately halogenated swimming pools will provide a serious infection hazard for children. Freshwater bathing beaches where the water is unchlorinated were found to have relatively high indices of enteric bacteria.

McLean, Donald M.; Brown, John R.; and Nixon, Murray C.

13. MICROBIOLOGICAL AND CHEMICAL INVESTIGATIONS OF OUTDOOR PUBLIC SWIMMING POOLS. *Canadian Journal of Public Health*, 52:61, February 1961.

During summer 1960, coliform organisms and other enteric bacteria were recovered from two outdoor public swimming pools in Toronto despite levels of free residual chlorine which were maintained above 0.2 p.p.m. No virus was isolated from 88 samples of water. While levels of ammonia nitrogen and organic nitrogen remained relatively unchanged in an overflow-refill pool, concentrations of these constituents increased steadily toward the end of the summer in the recirculating pool.

Meslin, Jerry

14. WATCH OUT FOR POOL GRANULOMA. *Swimming Pool Age*, 34:12:164, December 1960.

Discusses a skin disease, granuloma, that may be contracted in swimming pools from scratches or abrasions. Points out that studies in Sweden and California have revealed that rough pool surfaces, particularly walls, and poor water disinfection are contributing factors in the spread of the disease.

Mollohan, Cecil S.; and Romer, Mary S.

15. PUBLIC HEALTH SIGNIFICANCE OF SWIMMING POOL GRANULOMA. *American Journal of Public Health*, 51:6:883, June 1961.

Reports an outbreak of more than 200 cases of "sore elbow" (swimming pool granuloma) caused by *Mycobacterium balnei* with the source of the infection being a swimming pool in Glenwood Springs, Colo. Describes the case findings, clinical features, treatment, laboratory findings, the swimming pool, epidemiology, tuberculin reaction, and doses with several factors having marked public health implications that have been raised by the study.

Morgan, John K.; and Blowers, Robert

16. SWIMMING POOL GRANULOMA IN BRITAIN. *The Lancet*, One for 1964; 7341: 1034, May 9, 1964.

Two cases of swimming pool granuloma are described. Two young boys who grazed their noses, while diving, on the bottom of a saltwater swimming pool developed lesions at the site of the injury. Points out that this is only the second reported outbreak of granuloma in sea water.

Paffenbarger, Ralph S., Jr.; Berg, Gerald; Clarke, Norman A.; Stevenson, Robert E.; Pooler, Barbara G.; and Hyde, Robert T.

17. VIRUSES AND ILLNESSES IN A BOY'S SUMMER CAMP. *American Journal of Hygiene,* 70:3:254, November 1959.

This report concerns virus infection and minor illnesses in a boy's summer camp in 1957. The intensity and frequency of exposure to specific communal objects, including the swimming pool, did not increase the risk of enterovirus infection. No virus was recovered from swimming pool water sampled daily during the camp season.

Romer, Mary; Heacock, Charlotte; and Takacs, Virginia

18. AN EPIDEMIC OF SWIMMING POOL GRANULOMA. *Nursing Outlook,* 8:12:690, December 1960.

Of 262 cases of swimming pool granuloma, all gave histories of swimming in the Glenwood Springs, Colo., pool. *Mycobacterium balnei*, the same organism found in the lesions of cases, was isolated from crevices in the rock which formed the walls of the non-chlorinated, native stone, mineral pool.

B. SAFETY

Aline, Jeffrey

19. FOUR WAYS TO A SAFER POOL. *Swimming Pool Age,* 38:10:30, October 1964.

A discussion of the need for qualified lifeguards to maintain safety in the pool. The following standards are suggested: (1) The head guard at any public pool should be a college graduate and preferably one with a major in physical education; (2) Half of the guards should be water safety instructors with a minimum of 3 years in water safety work, (3) The remaining half of the lifeguards should be certified as having passed senior life saving and be at least 18 years old; (4) All guards should be expected to keep abreast of new developments in water safety.

Anonymous

20. ARC ADOPTS MOUTH-TO MOUTH RESUSCITATION. *Swimming Pool Age,* 33:9:65, August 1959.

Outlines the mouth-to-mouth technique of artificial respiration that has been approved by the American Red Cross.

21. BASIC RULES FOR SAFETY. *Swimming Pool Age,* 38:4:45, April 1964.

Suggests how to make a swimming pool as safe as possible. Included are safety rules for overflow gutters, drainage outlets, diving boards, and diving towers. The importance of having an adequate number of qualified lifeguards is stressed.

22. HANDLING CHLORINE SAFELY. *Swimming Pool Age,* 31:11:92, November 1957.

Provides suggested safety measures for handling chlorine gas equipment including first aid measures, good pipe jointing practices, and testing systems for chlorine gas leaks.

23. THE LIFEGUARD MUST KNOW HIS POOL'S PRIME DANGER AREAS. *Swimming Pool Age,* 33:4:38, April 1959.

A list of chief pool danger areas with reasons why they are considered dangerous has been compiled from questionnaires filled out by lifeguards of the Department of Recreation and Parks, City of Los Angeles. Some of the danger areas are: the bathers' entrance; the pool deck; pool ladders; and diving towers.

24. A MANUAL FOR THE LIFEGUARD. *Swimming Pool Age,* 33:5:32, May 1959.

Gives some general rules plus some "do's" and "don'ts" for a lifeguard, and some rules that the public should follow. Provides a list of suggestions to aid in orienting swimming personnel in proper emergency procedures.

25. THE NEW RESUSCITATION TECHNIQUES: A REVIEW. *Swimming Pool Age,* 33:6:54, June 1959.

Discusses the mouth-to-mouth, mouth-to-nose, and arm-lift, back-pressure methods of artificial respiration, along with the Richard method, a technique of resuscitation of infants and small children. Diagrams are given showing the techniques to be used in each method. The importance of immediately starting artificial respiration on a person who has stopped breathing is stressed.

26. NEW SAFETY TIP FOR POOLS. *Swimming Pool Age,* 39:4:46, April 1965.

A new idea in marking pool depths is a "contour depth line" which is a painted or taped line on a wall or fence showing the graduated depth of the pool. By standing beside it, a child can compare his height with the pool depth, and hopefully will play only in areas where he can safely accommodate himself.

27. POOL PERSONNEL: THE LIFEGUARD AND SWIMMING INSTRUCTOR. *Swimming Pool Age,* 31:4:50, April 1957.

A list of the duties and responsibilities of a pool lifeguard is given. It is recommended that both lifeguards and swimming instructors hold an American Red Cross water safety instructor's certificate. Suggestions are offered for a procedure that will permit servicing of accident cases at the pool in a manner that will be to the best interest of the victim, the city, and the insurance company.

28. PUBLIC SAFETY MATTER OF COMMUNICATING. *Swimming Pool Data and Reference Annual,* 33:158, 1966.

Gives tips on how to effectively relay safety messages to the public. The yardstick in measuring communication success is not how much was said or written, but how much got through to people and what they did with it in terms of few accidents.

29. WHEN A LIFE IS IN BALANCE—RESUSCITATORS. *Swimming Pool Data and Reference Annual,* 33:153, 1966.

Discusses the importance of having a resuscitator readily available at a public swimming pool. Points out that many resuscitator models are light, small, and completely portable. Everything fits into a lightweight carrying case.

Caldwell, Stratton F.

30. SAFETY IN THE SWIMMING POOL. *Swimming Pool Age,* 31:9:54, September 1957.

Qualifications that a lifeguard should possess are outlined. Swimming pool regulations are listed with regard to the pool, the pool deck, conduct in the water, and diving board safety. A one-minute quiz is given that will aid in determining if a swimming pool possesses the requirements needed to be considered safe for its patrons.

Damonte, Lowell

31. SAFETY IN POOL DESIGN AND OPERATION. *Swimming Pool Age,* 34:7:28, July 1960.

A review of some of the swimming pool features that can cause accidents including diving boards, diving board ladders, slides, and smooth pool decks. Stresses that reliable lifeguards are an important factor in pool safety.

Fisher, Jack

32. POOL SAFETY RULES, REGULATIONS, AND PROCEDURES. *Swimming Pool Age,* 31:5:42, May 1957.

Some general rules governing the behavior of swimmers in the swimming area and good sanitation practices are reviewed. Guidelines are suggested for setting up rules and regulations for a pool or swimming area and for procedures used to implement the regulations.

Fry, Eugene B.

33. "RESUSCITATORS ARE A MUST FOR POOL AND BEACH AREAS." *Swimming Pool Age,* 40:7:30, July 1966.

Included in this discussion of resuscitators is recommended criteria for selecting a resuscitator to meet pool or beach needs. It is noted that lifeguards should be trained to operate resuscitation equipment and their rescue operation geared to this piece of equipment.

Haapaniemi, Ed

34. HOW TO REVITALIZE THE SAFETY PROGRAM AT YOUR POOL. *Swimming Pool Age,* 32:11:58, November 1958.

Some major points in revitalization of a pool safety program are: (1) condition the individual to your safety effort by giving him a desirable facility to enjoy; (2) identify public awareness of your safety effort; (3) condition the individual to your safety effort by taking advantage of every educational opportunity that is available.

Jones, John C., Jr.

35. POOL SAFETY FOR MOTELS, HOTELS, AND APARTMENTS. *Swimming Pool Age,* 36:4:35, April 1962.

Outlines items that should be considered in a comprehensive safety program including rescue and first aid equipment, rules for patrons, and lifeguarding. Points out the necessity of inspection and maintenance of the pool as safety aids.

Kauffman, Earl

36. DROWNINGS . . . *Parks and Recreation,* 48:5:315, May 1965.

Discusses human factors in drowning, environmental factors in drowning, and the interaction between man and his environment. The need for a major offensive involving education, legislation, and control is illustrated by two studies of drownings.

Lanoue, Fred R.

37. LEARN TO "DROWNPROOF" YOURSELF THIS SUMMER. *Swimming Pool Age,* 33:6:40, June 1959.

The experiments conducted to perfect the Lanoue-Georgia Tech technique of "drownproofing," together with an exact description of its procedure are detailed. The experiments conducted showed that poor swimmers, using the technique, stayed afloat for an average of four hours and 40 minutes.

Lawliss, John S.

38. WARNING! UNDERWATER SWIM CAN BE DANGEROUS. *Swimming Pool Age,* 38:4:56, April 1964.

Discusses observations of a case of loss of consciousness as a result of hyperventilation. The author concludes that hyperventilation is a dangerous procedure, particularly when carried to an extreme. No one is safe from its possible harmful effects because the condition of any diver varies sufficiently from day to day to the extent that no one can predict when unconsciousness may appear.

McArthur, William D.

39. SPOTLIGHT ON POOL SAFETY. *Swimming Pool Age,* 34:12:76, December 1960.

In planning safely for pool and patrons five areas should be considered: (1) general construction plans; (2) sanitation; (3) insurance; (4) instruction for safety; (5) pool guarding. Each of the five areas is discussed with emphasis on lifeguarding.

Meldrum, Paul

40. WATER SAFETY. *Canadian Journal of Public Health,* 56:6:239, June 1965.

Suggests facilities and equipment that should be required to promote safety at waterfronts, swimming pools, and in boats. The importance of public knowledge of general swimming and boating safety, rescue, and artificial respiration is stressed. Lists a set of rules that apply to the behavior of the public at pools and waterfronts.

Michael, Jerrold M.

41. SAFETY: THE POOL DESIGNER'S RESPONSIBILITY. *Swimming Pool Age,* 34:7:36, July 1960.

Lists the features of a swimming pool that should be properly designed to reduce safety hazards including steps, chlorination equipment, and electrical wiring. Suggests pool rescue and first aid equipment that should be at poolside and discusses the responsibilities of lifeguards.

Moor, D. W., Jr.

42. INCREASE POOL SAFETY WITH ATTRACTIVE MATTING. *Swimming Pool Age,* 31:2:47, February 1957.

The use of rubber matting as a safety measure in swimming pools is discussed showing how different types of matting can be used around the sides of the pool, the bottom of the pool, and on steps leading into the pool to aid in preventing accidents caused by slippery surfaces.

Pezolt, C. W.

43. HOW GOOD IS YOUR SAFETY PROGRAM? *Swimming Pool Age,* 34:12:160, December 1960.

Discusses five types of emergencies which can occur at a swimming pool and the procedure to follow in each case: (1) a drowning person who is conscious when rescued; (2) a drowning person who is unconscious when rescued; (3) minor cuts or bruises; (4) broken bones; (5) heavy bleeding. Gives basic first aid procedures for giving temporary care to a victim of illness or accident, until a physician can be obtained.

Yavapai County, Ariz., Youth Center

44. POOL SAFETY AND SANITATION. *Swimming Pool Age,* 31:7:74, July 1957.

Requirements that are necessary for a competent lifeguard are suggested. Duties of a lifeguard concerning pool supervision and sanitation are listed. A complete set of rules is given governing swimmers in regard to the pool, the pool deck, the dressing room, and sanitation.

C. DESIGN AND CONSTRUCTION—General

Anonymous

45. BUILDING THE HOME SWIMMING POOL, PART I AND PART II. *Swimming Pool Age,* 31:8:22, August 1957; 31:9:26, September 1957.

Data and information are presented to aid in the design and construction of small outdoor swimming pools. Suggestions are included on the planning, operation, and maintenance of a pool along with design and construction recommendations.

46. DESIGN FOR A SCHOOL POOL. *Swimming Pool Age,* 34:12:64, December 1960.

The indoor swimming pool at the McMurrich Senior Public School in Toronto, Canada, serves as a recreation facility for both students and the community. The deck-level pool features a safety ledge at the deep end along the sides at a level below water of 4 feet. The concrete block walls of the pool building were finished with an epoxy paint. The architects claim the life and maintenance costs of the epoxy finish to be at least the equal of tile.

47. FLUSH DECK SWIMMING POOLS. *Public Works,* 88:3:116, March 1957.

The design features of a water level pool are outlined. This type of pool utilizes an overflow gutter located in recessed sections of the deck surrounding the pool. The surface scum in the pool is removed by a series of skimmers placed at intervals around the perimeter.

48. HERSHEY BUILDS NOVEL INDOOR-OUTDOOR POOL. *Swimming Pool Data and Reference Annual*, 32:41, 1965.

Discusses the enclosure of an indoor-outdoor pool in Hershey, Pa. The cover is glass insulated and the roof is constructed of T-iron. The sides and overhead are fully retractable.

49. NEW SCHOOL POOL STRESSES SAFETY, UTILITY. *Swimming Pool Age*, 31:4:48, April 1957.

This indoor pool in Long Island has such safety features as cleat-tread tile at both ends for nonslip, competitive turns; a nonslip tile deck around the pool, and toegrip nosing, made of ceramic tile, around the pool's edge as an added precaution against slipping. Light reflection on the pool is reduced by using prismatic glass windows and by using lights with diffused lens.

50. NOT AN ORDINARY PARK POOL. *Park Maintenance*, 19:3:50, March 1966.

Describes how the swimming pool in Myersdale, Pa., has been improved each year and now this year a filtration system is being added. Initial construction was an earthen pool and sand beaches. Now the pool is completely concreted. Future plans call for the construction of a bathhouse.

51. ONE POOL — TWO OVERFLOWS. *Swimming Pool Age*, 31:11:78, November 1957.

Details are presented for a pool with overflow troughs at deck level and 18 inches below. This arrangement allows the depth to be raised or lowered 18 inches providing a larger portion of shallow or deep water as needed.

52. A POOL "FOR EMPLOYEES ONLY." *Swimming Pool Age*, 33:10:35, October 1959.

The Flick-Reedy Corp., when building a new plant included a swimming pool for the benefit of employees and their families. The 40- x 60-foot pool, in addition to recreational use, is being used as a test vehicle for a new chemical and water filter developed by the company. The swimming pool room walls are coated with an impervious, sprayed-on plastic designed to resist the attacks of a high humidity atmosphere.

53. SWIMMING POOL COVERS. *Swimming Pool Age*, 32:9:32, September 1958.

The biggest advantage of a swimming pool cover is its ability to keep out leaves and debris which would clog drains and foul filters if left in the pool. There are a large variety of cover materials but the two major plastics used for covers are vinyl and nylon. The different weights and sizes of pool covers and methods for tying down covers are described.

54. SWIMMING POOL DESIGN. *Institutions*, 44:6:78, June 1959.

Offers suggestions on designing the various features of a swimming pool including pool size, pool depth, safety features, pool fittings, and mechanical equipment. Water quality requirements are briefly discussed. The importance of designing a pool with built-in safety features is stressed.

55. SWIMMING POOL HALL OF FAME BECOMING REALITY. *Swimming Pool Data and Reference Annual*, 32:28, 1965.

A description of the pool area and the building of the Swimming Hall of Fame in Fort Lauderdale, Fla. Also included are the expected expenses and revenues from operating the pool.

56. ZERO-DEPTH SHALLOW-END OUTDOOR THERAPY POOL. *Swimming Pool Age*, 33:10:39, October 1959.

The Easter Seal Society has constructed a pool at their summer residential camp near Harrisburg, Pa., that allows crippled children to enjoy the experience of swimming. The 60- x 40-foot wedge-shaped pool has a depth variance from zero to nine feet. The sloping shallow area, extending 36 feet, permits wheel chairs to enter the pool and has a maximum depth of 3 feet. The shallow area is separated from the diving area by a safety rail and galvanized wire screen.

Artz, Robert M.

57. COVERED POOL GAINS DISTINCTION. *Parks and Recreation*, 47:2:72, February 1964.

Describes the conversion of an outdoor swimming pool in Springfield, Ore., to a combination indoor-outdoor pool. Discusses the "Lamella" type of roof support, and the heating, ventilating, and lighting systems.

58. A SUMMER POOL DONS A WINTER COAT. *The American City*, 79:8:94, August 1964.

See item No. 57.

Benson, Jewell R.

59. THE SOIL-ISOLATION CONSTRUCTION METHOD. *Swimming Pool Data and Reference Annual*, 30:20, 1962.

The principles of soil-isolation and the methods of construction are reviewed. Prefabricated asphalt or asphalt-plastic linings are laid directly over the soil and covered with a cushion course of permeable sand or sand-gravel providing a barrier between the pool and the soil. This type of soil-isolation minimizes heaving and cracking of swimming pools due to the destructive action of swelling soils and frost.

60. WHERE SOIL AND WATER SHOULD NOT MIX. *Public Works,* 92:11:109, November 1961.

See item No. 59.

Bosico, Tony

61. A STUNNING "E"-SHAPED OLYMPIC POOL FOR RECREATION, EDUCATION, AND COMPETITION. *Swimming Pool Age,* 36:1:38, January 1962.

This pool in Easton, Pa., is built on land which was formerly a dump. The gunite pool features a recirculation system consisting of 21 automatic surface skimmers which pull 513 gallons per minute from the pool and 29 inlets to return filtered water to the pool. The specially built diatomaceous earth filters handle loads of 1,000 to 1,500 swimmers daily and require back-washing once a week.

Davis, E. H.; and McCollister, H. M.

62. NEW DESIGN AND CONSTRUCTION PRINCIPLES FOR POOLS SUBJECT TO SEVERE CLIMATIC CONDITIONS. *Swimming Pool Data and Reference Annual,* 28:12, 1960.

The nature of common structural failures in swimming pools of standard design is discussed. The steps leading to development of the new design concepts are reviewed. Typical swimming pools are presented as evidence of the success which has been achieved through the application of the new principles.

DeHaven, Vern

63. BUILDING ON-THE-JOB-SITE "EXPANDED METAL" CONCRETE POOLS. *Swimming Pool Age,* 31:3:39, March 1957.

Describes a method for building swimming pools in which expanded metal is assembled on the job site into a double-wall form into which concrete is poured and the "forms" left in the wall to add to the reinforcing structural strength. Among the advantages claimed for this type of construction are a very strong structural wall; low-slump concrete can be used; and a monolithic poured concrete structure free of expansion joints.

Donahue, Ronald

64. ACTIVITY IS KEY TO SIX-ACRE PARK IN FREMONT, NEBR. *Park Maintenance,* 18:3:56 March 1965.

Six-acre Ronin Park in Fremont, Nebr., includes playground equipment, a swimming pool, and a lighted softball field. The design of the park facilities is discussed.

Donoghue, John L.

65. INDOOR INTO OUTDOOR POOL IN FOUR MINUTES. *Swimming Pool Age,* 33:11:67, November 1959.

A pool in the Chicago Park District has an electrically operated movable roof that is moved on a 20-inch tram beam from above the pool to a position over the bathhouse. The heating and ventilation of the natorium is provided by wall-hung steam unit radiators. The radiators are capable of wiping condensation from the walls.

66. NO UNUSED AREAS IN SWIMMING POOL DESIGN. *Public Works,* 94:6:104, June 1963.

T-shaped or L-shaped pools with shallow areas along the entire longitudinal side are suggested as a design for maximum usage of swimming pool area. The design detail of a T-shaped pool in Morton Grove, Ill., is outlined, showing maximum usage of pool area.

Ellis, Virgil M.; and LaBoiteaux, R. M.

67. ALUMINUM SWIMMING POOLS. *Park Maintenance,* 11:3:24, March 1958.

The city of Hamilton, Ohio, found that an aluminum swimming pool offered freedom from cracking, leaking, and rust in addition to unique built-in design features. The rollout ledge extending around the pool perimeter is part of the main structure combined with a specially formed extrusion which serves as the overflow drain and is covered by the rollout ledge with drain slots to provide skimming in every perimeter foot of the pool.

Enbody, M. W., Sr.

68. IS THE HOME POOL "ENGINEERED?" *Swimming Pool Age,* 33:6:35, June 1959.

The importance of having an adequate foundation for a swimming pool is stressed. Sand, sandy loam, and decomposed granite provide stable foundations. Some of the diatomaceous shales, adobe, or other expansible soils are dangerous and the pool should be designed for this condition.

Friedland, Alan L.; and Yonelunas, Robert J.

69. NEW TRENDS IN SWIMMING POOL DESIGN. *Public Works,* 96:4:121, April 1965.

Some of the items that should be considered in designing a swimming pool are discussed including pool shape, deck space, management facilities, filter units, gutters and skimmers, and lighting. Some of the new design trends in pools are outlined such as the modified T-shaped pool with the shallow area in the crossbar and the deep section in the stem.

Fritz, David H.

70. APPROACH TO ECOMOMY IN POOL DESIGN, CONSTRUCTION. *Parks and Recreation,* 44:4:160, April 1961.

Highland Park, Ill., found careful planning, subcontracting, selfservice lockers, concrete trench supply and return water system, package filter, and concrete-block wall construction all add up to substantial savings in pool construction. A 6-point system that could save over $50,000 in construction costs is outlined.

Gottschalk, Jere L.

71. THE PRESSURE ON THE POOLS. *Parks and Recreation,* 43:1:14, January 1960.

Points out that with increased leisure time more pools will have to be constructed to accommodate patrons. Stresses that in planning for a pool considerable thought should be given to the indoor-outdoor type pool which allows year-round use. Some of the new trends in swimming pool construction such as package filter plants and separate swimming, diving, and wading pools are discussed.

Graves, Charles M.

72. GUIDELINES TO MORE EFFECTIVE POOL PLANNING, DEVELOPMENT, CONSTRUCTION. *Swimming Pool Age,* 37:9:18B, September 1963.

Suggestions are given on the pool size, pool markings and lines, pool depths, deck space, and wading pools. Points out that a pool, to best serve the users should be designed to include regulation lengths, proper water depths, adequate equipment, and safety control features.

73. MILLION DOLLAR RECREATION CENTER FEATURES T-SHAPED, OLYMPIC-SIZE POOL. *Swimming Pool Age,* 34:7:70, July 1960.

This T-shaped pool in Cobb County, Ga., provides separation of swimming and diving areas. The water surface is made visible to the divers by bubbles formed from pumping compressed air into the diving area. Main drains are of the antivortex type which safeguard the swimmer because no vortex is caused by water draining from the pool. After being filtered by diatomaceous earth filters and chlorinated the water is introduced into the pool by jet-type inlets.

74. NEW TRENDS IN SWIMMING POOL DESIGN. *Swimming Pool Age,* 37:1:40, January 1963.

Considers new design trends in construction, pool shape and size, gutters, inlets, main drains, and bathhouses. Tables show a complete breakdown of construction costs on five swimming pools of different size and shape.

75. NOW UNDER CONSTRUCTION — COST: $61,000. *Swimming Pool Age,* 33:7:48, July 1959.

The walls and floor of the L-shaped pool at Douglas, Ga., were poured as a monolithic slab, thus eliminating the use of expansion joints which can be a prime source of leaks. An anti-vortex-type main drain was used for the safety of swimmers. This type of drain eliminates the vortex over the drain which has been the cause of accidents, the swimmers being held down by the force of the suction. Because the pool is the neighborhood type and most people using the pool dress at home, the size of the bathhouse was kept at a minimum.

76. THE OUTDOOR POOL AND BATHHOUSE. *Swimming Pool Data and Reference Annual,* 28:22, 1960.

See item No. 75.

77. SUCCESSFUL POOL CENTERS ARE PLANNED THAT WAY. *Swimming Pool Data and Reference Annual,* 32:16, 1965.

See item No. 72.

Griffin, A. E.

78. CHEMICAL FEED EQUIPMENT. *Swimming Pool Age,* 32:11:56, November 1958.

Describes the specialized equipment used to handle gas, liquid, and solid chemicals in pool water treatment. The following conclusions are reached: (1) feeders are available for any chemical that might be needed in swimming pool water treatment; (2) all chemical feeders are corrosion resistant; (3) when ordering chemical feeders always specify the exact chemical to be handled and the form; namely, gas, liquid, or solid; (4) where possible state the amount and rate of chemical to be added: (5) modern chemical feeding equipment is durable and accurate.

Hirsch, Phil

79. UNUSUAL DESIGN CUTS SWIMMING POOL COSTS. *Public Works,* 88:2:113, February 1957.

Two pools in Park Ridge, Ill., were constructed of welded steel plates and utilize "closed circuit" water distribution systems. Both pools are equipped with floor trenches from which treated water is introduced into the pools. With this type of supply arrangement most of the matter that would normally settle is carried to the surface and removed by scum gutters thereby reducing the frequency of pool cleaning.

Hubbard, Lloyd S.

80. DESIGN PROBLEMS OF LARGE POOLS. *Swimming Pool Age,* 37:6:16, June 1963.

Considers factors of preliminary design including sizing and location of the facility, choice of pool shape, choice of indoor or outdoor pool, bath house design, and budgeting. Points out the importance of each factor and careful consideration of them before undertaking the specific design of a pool.

81. HUB OF A COMPLETE COMMUNITY RECREATION COMPLEX. *Swimming Pool Data and Reference Annual,* 31:12, 1964.

The Olympic size, L-shaped pool at Oak Park, Ill., employs a reverse flow type recirculation system which removes water at the shallow end first to reduce excessive contamiantion in this area. Mercury vapor floodlights, used to light the pool area at night, offer many advantages. It is estimated that the lamps will not burn out for nearly 20 years since they are used for only three hours per evening during the swimming season.

Jackson, Howard E.

82. MOVIE THEATRE INTO SWIM SCHOOL. *Swimming Pool Age,* 33:6:50, June 1959.

A former movie theater in Everett, Wash., houses a swimming pool. The pool, which is supported by 21 reinforced concrete pillars set on 4-foot pads on the hardpan, is located where formerly the main floor had been. The theater balcony was left in to provide spectator seating. Existing restrooms were remodeled to provide dressing rooms, showers, and toilets.

Jerus, George R.

83. DESIGN OF SWIMMING POOLS. *Air Conditioning, Heating, and Ventilating,* 54:2:114, February 1957.

A detailed review of items that should be considered in swimming pool design including pool size, recirculation system, filters, pumps, pool inlets and outlets, and disinfection. Numerous diagrams illustrate such items as the recirculation system piping, hookup for diatomaceous earth filter and precoat unit, and piping arrangement for a scum gutter.

Kahms, Frederick W., Jr.

84. WHAT MAKES A GOOD SCHOOL POOL? *Swimming Pool Data and Reference Annual,* 30:51, 1962.

A number of the country's leading coaches speak out frankly on those features which they consider good—and bad—in their own pools and what they would like to have built into the "ideal" pool if they could plan over again. Included in the discussion are: location, pool size, swimming lanes, water depth, diving, pool marking, pool deck area, and lighting.

Leicester, John B.

85. MOVABLE BULKHEAD PROVIDES FLEXIBILITY. *Swimming Pool Age,* 39:4:19, April 1965.

The School of Physical Education of the University of Saskatchewan found that the answer to the problems of flexible pool length, a distinct diving area, and adequate pool division was a movable bulkhead. The specifications for the bulkhead are discussed.

86. MOVABLE BULKHEAD PROVIDES FLEXIBILITY. *Swiming Pool Data and Reference Annual,* 33:128, 1966.

See item No. 85.

MacDonald, Kenneth

87. COLUMN - FREE, SUPPORTED - BY - CABLES STRUCTURE. *Swimming Pool Age,* 35:6:22, June 1961.

The pool building of Central Washington College in Ellensburg, Wash., is completely supported by bridge strand cables on pre-stressed concrete pylons. The interior of the building has sprayed on insulation and zig-zag walls to reduce noise.

MacKenzie, M. M.

88. U.S. AIR FORCE ACADEMY POOL. *Swimming Pool Age,* 33:11:78, November 1959.

Both new pools were designed with movable bulkheads to allow for large or small teaching stations and to permit swimming competition over various established courses. The bulkheads, weighing about 8 tons each, are power operated. The intramural pool has a constant depth of 7 feet. The pool is used for intersquadron competition in water polo and swimming as well as for instruction. The second pool has a depth ranging from 4½ to 18 feet. The bulkheads permit the diving and swimming area to be separated.

Mangan, Florence J.

89. POOL-SKATING COMPLEX GIVES GREAT NECK A YEAR - AROUND CENTER. *Park Maintenance,* 19:3:32, March 1966.

This recreation facility in Long Island, N. Y., includes a swimming pool for summer recreation and an ice skating rink for winter recreation. The pool and rink are both operated on the annual membership basis.

Mason, Alvin A.

90. WE GIVE AN OLD SWIMMING POOL NEW IDEAS. *The American City*, 73:91, August 1958.

For $57,000 the city of Portsmouth, N. H., has converted a fill and draw pool, 30 years old, having no treatment equipment, to a new pool with 900,000-gallons capacity and diatomaceous earth filters.

McCloud, Paul W.

91. "TWENTY-SIX SKIMMERS, TWENTY FEET APART." *Swiming Pool Age*, 34:12:112, December 1960.

A community swimming pool in Wyomissing, Pa., has these unusual features: (1) water is supplied from a century-old spring house: (2) the recreation area and pool are built on a site that was once swampy wasteland; (3) the pool is equipped with 26 skimmers which in turn are filtered through a vacuum-type filter. The 26 skimmers, placed 20 feet apart, pull about 20 gallons of water per minute to the filter.

Means, Louis

92. PLANNING AQUATIC SPACE AND FACILITY REQUIREMENTS. *Swimming Pool Age*, 31:7:24, July 1957.

Recommendations are given for designing swimming pools to accommodate elements of an aquatic program such as instruction, competition, recreation, and diving. Design features including space requirements are given for facilities incorporated in pool planning including bathhouse, checkroom and office. Pool heating, lighting, and water quality control are briefly reviewed.

Meslin, Jerry

93. AN OPERATOR'S ADVICE TO POOL BUILDERS. *Swiming Pool Age*, 33:10:21, October 1959.

Some examples of pool design and building errors that impose hardships on the pool operator and his patrons. For instance, one designer installed a diatomaceous earth filter too close to the ceiling. Consequently, when the filter septums needed cleaning or repairing, a hole had to be chopped through the deck to remove the elements.

94. A SIDEWALK VIEW OF U-MIAMI POOL CONSTRUCTION. *Swimming Pool Data and Reference Annual*, 33:146, 1966.

The pool at the University of Miami possesses the newest features in pool design and will be heated in cold weather for year-round use. Among the new features are: an observation room with an underwater window for coaching and "TV"; a surface rippling system to provide better diving visibility; and the diving area is located in the center of the pool.

Michael, J. M.

95. HOW TO CALCULATE MAXIMUM SWIMMER LOAD. *Swimming Pool Age*, 33:11:174, November 1959.

An example problem of calculating used loading for a pool is solved using American Public Health Association criteria for user loading.

96. HOW TO CALCULATE MAXIMUM SWIMMER LOAD. *Swimming Pool Data and Reference Annual*, 28:364F, 1960.

See item No. 95.

97. HOW TO DETERMINE THE ACCURACY OF BASIC POOL EQUIPMENT. *Swimming Pool Age*, 33:11:124, November 1959.

Sample calculations are given for determining if the basic equipment supplied for a 164- x 75-foot pool is adequate for a 6-hour turnover. The basic equipment includes: 5 horizontal sand filters, 8 feet in diameter and 14 feet long operating with a 50-foot head loss; 40 h.p. double suction centrifugal pump with 50 per cent efficiency at high load conditions, dry alum feeder with a maximum capacity of 200#/24 hrs.; diaphragm pump soda ash feeder with a maximum capacity of 180#/24 hrs.; gas chlorinator with maximum feeding capacity of 70#/24 hrs.; 4 main drains spaced 15 feet on centers at deepest point having 8" diameter outlet pipes with 22-square-inch gratings; 30, 2" adjustable inlets on equal centers completely around pool.

Mills, G. David

98. LAKEWOOD "WADED" INTO SMALL-FRY SWIMMING POOL DEMAND. *Park Maintenance*, 19:3:56, March 1966.

Outlines design, construction, and operation of six wading-spray pools in Lakewood, Calif. The pools were built to accommodate youngsters, under eight years of age, who were unable to swim in the city's municipal pools because of a safety policy.

National Swimming Pool Institute

99. CORROSION IN SWIMMING POOLS AND A GENERAL GUIDE TO MATERIALS SELECTION. *Swimming Pool Data and Reference Annual*, 31:72, 1964.

A review of: the general characteristics of pool waters; factors that determine the rate of corrosion; how pool chemistry affects corrosion and galvanic action; the typical behavior of materials in pool water, including bare steel, copper, stainless steel, aluminum, and plastics; typical behavior of materials in soils; atmospheric corrosion and other factors influencing the choice of materials for deck equipment.

100. THE MANY USES OF PLASTICS IN POOLS, PART I AND PART II. *Swimming Pool Age*, 38:10:16, October 1964; 38:11:24, November 1964.

A report on the use of plastics for swimming pool parts. Field experience has indicated no difficulties with corrosion and few problems related to weathering or aging, but many failures due to structural inadequacy. Of the problems being encountered, most could be attributed to: (1) improper selection of material; (2) incorrect design of molded parts; (3) inferior fabrication techniques. A few of the typical applications of plastics in swimming pool parts are piping, pumps and valves, deck boxes, and surface skimmers.

101. THE ROLE OF ALUMINUM IN POOLS, PART I AND PART II. *Swimming Pool Age*, 39:4:52, April 1965; 39:5:38, May 1965.

A general report on aluminum including a discussion of corrosion-resisting properties, corrosion resistance in various environments, and component application. Points out that galvanic effects can promote corrosion of aluminum and recommends that aluminum and more cathodic metals be electrically insulated from each other.

102. THE ROLE OF COPPER AND COPPER-BASE ALLOYS IN POOLS, PART I AND PART II. *Swimming Pool Age*, 38:6:12, June 1964; 38:7:20, July 1964.

This report reviews the various characteristics of copper and copper-base alloys such as corrosion resistance in various environments, and the advantages offered for various uses in swimming pools. It is concluded that copper is a very corrosive resistant metal. Precautions are given which should be maintained during construction, operation, and maintenance of the pool to assure satisfactory performance of copper and its alloys.

103. THE USE OF PLASTICS IN POOLS. *Swimming Pool Data and Reference Annual*, 32:179, 1965.

See item No. 100.

104. THE USE OF STAINLESS STEELS IN POOLS. *Swimming Pool Data and Reference Annual*, 32:154, 1965.

A general report on stainless steel including a discussion of corrosion-resisting properties and corrosion resistance in various environments. Stainless steels combine outstanding mechanical properties with excellent corrosion resistance to all types of pool waters, soils, and atmospheres. It is pointed out that in fresh water pools, regardless of application, good to excellent performance can be obtained with type 304 stainless steel for submerged components, underground piping, and deck equipment.

Newman, J. S.

105. THE WATER LEVEL DECK DESIGN. *Swimming Pool Data and Reference Annual*, 29:21, 1961.

A review of principles governing the design of a water level deck. The overflow gutter is located near the edge of the pool in a depressed section of the deck and is covered with metal grating. The deck is sloped to the overflow gutter.

Nicholls, C. P. L.

106. SWIMMING POOL SIDEWALL DESIGN, PART I AND II. *Parks and Recreation*, 41:2:92, February 1958; 41:3:132, March 1958.

In this discussion of sidewall design, diagrams show some of the steps in the evolution of pool sidewalls and various designs used in recent years. Among the items covered in the article are the "gunite" method of constructing sidewalls, listing some of the disadvantages and the design of an overflow trough or scum gutter.

Paddock, Pascal P.

107. THE POOL'S STRUCTURAL SHELL. *Swimming Pool Age*, 33:5:25, May 1959.

The author notes that the structural shell of a swimming pool must be constructed to withstand temperature stresses and all tensile stresses which may develop from any possible loading. The shell should be unaffected by minor variations which may be found in the bearing capacity of the subgrade. A suggested method of reinforcing a concrete pool shell with steel is given.

Prizier, Paul

108. PLASTICS BECOMING BIG FACTOR IN BUILDING SWIMMING POOLS. *Swimming Pool Data and Reference Annual*, 33:152, 1966.

Advantages such as strength, ease of installation, corrosion resistance, and flexibility are making plastics a popular material for swimming pool parts. Among the many parts being manufactured are: surface skimmers, steps, filter elements, strainer baskets, and chlorinators. The design detail of a plastic skimmer is outlined in the article.

Rein, Martin

109. THE INSIDE STORY OF VINYL LINER POOLS. *Swimming Pool Data and Reference Annual*, 32:24, 1965.

The basic steps of constructing a vinyl liner pool are outlined. Among the advantages of vinyl liners are ease of maintenance, less expensive to care for than other pools, and the liner can be replaced. The main disadvantages of this pool are that it can be punctured by sharp instruments and once emptied it is troublesome to refit the liner.

Robineau, Jack

110. THE PRECAST CONCRETE SWIMMING POOL. *Swimming Pool Age*, 31:1:25, January 1957.

The use of precast, prefabricated concrete wall sections for swimming pools is discussed. Among the advantages claimed for the precast pool are the speed of installation; the concrete is accurately cured under controlled conditions at the manufacturers plant; and the walls are stressed to stand up in any climate condition without reliance on the ground for support.

Roderick, Ralph E.

111. NEW POOL EQUIPMENT, MATERIALS, AND PROJECT DESIGN FEATURES. *Swimming Pool Age*, 34:8:40, August 1960.

Outlines the features of the deck level, or roll-out pool. Among the advantages of this design are reduced water usage, reduced construction costs, and improved recirculation of pool water. A new feature in the recirculation system is the introduction of return water back into the pool through a series of small nozzles in the pool floor level. New features in deck area design, bathhouse design, and water conditioning equipment include uncovered bathhouses and package-type water treatment units.

Ruskin, John H.

112. SETTING PROPER BATHING LOADS. *Swimming Pool Data and Reference Annual*, 32:142, 1965.

An accident in a public pool caused Detroit to review its policy toward regulating pool facilities. A working subcommittee of an "ad hoc committee" developed a system of maximum bathing loads and other safety considerations for Detroit pools. The committee used the "7-4-1" formula which provides for seven persons per 100 square feet of shallow water, four persons per 100 square feet of deep water, and one person per 100 square feet of usable deck area. The controlling factors in setting user limits were those related to life-guarding, swimming space, and other safety factors.

Schiller, Kenneth

113. HOW TO PAINT FOR LASTING BEAUTY. *Swimming Pool Data and Reference Annual*, 29:154, 1961.

A report on the selection of proper pool paints and adequate preparation of the pool surface. It is pointed out that good pool paint and surface preparation go hand in hand. A good pool paint applied according to manufacturer's directions to a properly cleaned pool surface is a must.

114. HOW TO SAVE TIME IN PAINTING POOLS. *Swimming Pool Data and Reference Annual*, 33:93, 1966.

Discusses how to prepare concrete and steel pool surfaces for painting, what type of paint to use, and how to properly apply the paint. The importance of compatibility is stressed. On new pools, stay with the products of one manufacturer. Use his primer or undercoat, as the case requires, and his finish paints. Strict compliance with manufacturer's instruction is emphasized. A properly painted pool will reduce maintenance problems.

115. PAINTING AND PRESERVING. *Swimming Pool Data and Reference Annual*, 30:118, 1962.

When a plaster pool begins to show its age, painting the pool is shown to be less expensive than replastering. This article tells how to prepare the pool surface for painting and how to apply the paint. It is pointed out that to properly protect and revitalize a plaster pool, a quality paint that has been designed specially for plaster pools should be used.

Schillmoller, C. M.

116. CORROSION: THE GALVANIC BEHAVIOR OF METALS. *Swimming Pool Age*, 34:9:44, September 1960.

A discussion of galvanic corrosion including nine suggestions to minimize galvanic corrosion. Shows the galvanic series in which the metals and alloys are arranged in such a manner as to indicate their general tendencies to form galvanic cells. Practical experience has shown that metals and alloys within the nickel and copper groups have no great tendency toward mutual galvanic corrosion. Several of such materials may often be used togther.

117. GALVANIC CORROSION OF POOL METALS. *Swimming Pool Data and Reference Annual*, 29:158, 1961.

See item No. 116.

Smith, H. S.

118. SOME NEW IDEAS IN A SWIMMING POOL. *The American City*, 73:5:118, May 1958.

Describes the design features of a swimming facility in Menasha, Wis., including the pool, the bathhouse, the pool enclosure, and the lighting. The pool was designed for a 50-year useful life by employing such features as monolithic, poured-in-place concrete construction throughout, and a peripheral pipe gallery around the pool which allows access for maintenance of the piping system.

Smith, R. Jackson

119. DARTMOUTH COLLEGE UPDATES ITS SWIMMING FACILITIES. *Swimming Pool Data and Reference Annual,* 33:7, 1966.

Among the features incorporated in the new Dartmouth College indoor pool and natatorium are: an acoustical vapor barrier ceiling; a spectator-comfort heating and ventilation system; a recirculation system that permits access to most of the pipes without costly underground tunnels; and a deck-access glass-walled observation pit.

120. SEPARATE SWIMMING AND DIVING FACILITIES. *Swimming Pool Data and Reference Annual,* 29:24, 1961.

The author suggests that separate diving facilities be placed at one end of the swimming pool; the pool be oriented so the diver faces north to avoid sun glare; and a watercurling arrangement be built in so the diver can see the water surface. The design features of six facilities with separate swimming and diving facilities are outlined. A chart and diagram give Olympic dimensions for a swimming pool and diving platform

121. SHAPES AND SIZES OF DIVING POOLS. *Architectural Record,* 128:5:191, November 1960.

See item No. 120.

Sperber, Philip

122. POOL EQUIPMENT. *Swimming Pool Data and Reference Annual,* 30:132, 1962.

Discusses fittings, deck equipment, automatic skimmers, underwater lights, and the filter system in relation to what the equipment is expected to do, what kind of design is best, and what to look for when purchasing equipment.

Steffen, Paul

123. POOL EQUIPMENT AND DESIGN. *Swimming Pool Age,* 32:11:136, November 1958.

Great strides have been made in equipment design of pool products and choice of swimming pool materials during the past few years. Some of the new equipment is listed. The self-adjusting skimmer, which functions efficiently even though the water level in the pool varies as much as 4 inches, is described. Some recent research in filtration, such as that conducted on increasing dirt storage capacity, is reported.

Trapp, Gordon E.

124. TOPS IN DESIGN: SPA'S PRIZE WINNING PUBLIC POOL. *Swimming Pool Age,* 33:2:44, February 1959.

Presents the design detail of the indoor-outdoor pool at North Bend, Ore., a Swimming Pool Age award-winning public swimming pool. The pool enclosure was built facing south with high sloping windows to let in as much sunshine as possible. Overhead aluminum doors allow the pool to be opened to the outside in the summer. The pool is "U"-shaped to provide separate swimming areas.

Weir, Allan A.

125. WHY COATING POOLS IS IMPORTANT. *Swimming Pool Age,* 39:1:134, January 1965.

Discusses the various "paint" type coatings including chlorinated rubber, polyvinyl chloride, and epoxy polyamides, giving the advantages and disadvantages of each material. Factors that may damage paints such as hydraulic pressure and osmotic effects are reviewed and solutions to such problems are suggested.

Whitney, Frank

126. OUR INDOOR-OUTDOOR SWIMMING POOLS. *Swimming Pool Age,* 33:2:24, February 1959.

Discusses the design features of the indoor-outdoor pools at Derby Junior High School and Birmingham High School in Birmingham, Mich. Sliding glass doors, that compose one wall of the building, ride on their own tracks and can be stacked in front of either end door to provide an outdoor effect. This extensive use of glass created problems in heating, acoustics, and glare that required special design and construction considerations.

Weissner, F. H.

127. BLACKTOP (ASPHALT) SWIMMING POOLS. *Parks and Recreation,* 48:4:260, April 1965.

Lists advantages of black top (asphalt) swimming pools over those of concrete construction. Includes information about the construction of a blacktop (asphalt) pool under normal soil conditions.

Williams, Howard M.

128. DESIGN AND OPERATION OF THE INDOOR POOL. *Swimming Pool Data and Reference Annual,* 30:24, 1962.

Discussion of indoor swimming pool design and operation including the pool, spectator space, lighting, insulation and acoustical treatment of walls and ceiling, heating and ventilation, disinfection, filtration, and dressing and shower rooms.

129. FLUSH DECK POOLS PROVE THEIR WORTH. *Swimming Pool Age,* 39:1:149, January 1965.

Discusses the suitability of the deck-level-type pool design in regard to quality of water, safety, and construction cost. The author notes that the deck level pool is superior to other types of pool design for the following reasons: more economy in construction costs; more economy in operating costs; much easier to clean; safer.

Zerbe, John B.

130. UNUSUAL POOL IS FEATURE OF RECREATION CENTER. *Park Maintenance*, 18:3:48, March 1965.

The Cocoa Avenue Plaza in Hershey, Pa., is a recreation center that includes a host of facilities for year-round enjoyment. One of the main attractions is the indoor-outdoor swimming pool. A complete data and specification list for the plaza is featured in the article.

Zynda, Stanley G.

131. THE GUNITE POOL. *Swimming Pool Age*, 33:4:28, April 1959.

Gunite is essentially concrete without coarse rock. It is blown in place by air pressure without the use of forms except at the bond beam. This article discusses the construction of a swimming pool using gunite with emphasis on excavation of the site, placing of the reinforcement, and guniting the lining of the pool.

D. DESIGN AND CONSTRUCTION—Heating, Lighting, Ventilation and Noise Control

Anonymous

132. THE BAHAMA POOL. *Heating*, 22:179:394, November 1960.

Outlines details of a solar heating unit, which uses copper sheets with integral, parallel tubes as the heat-absorbing element. The heat collector is inclined at 60 degrees, painted black to increase absorption efficiency, and covered with plate glass to minimize heat losses. The collector is in series with the pumping and filtration plant of the pool and is expected to generate 1 million B.T.U. on a warm, clear day.

133. IES LIGHTING DATA SHEET—LIGHTING AN INDOOR POOL. *Illuminating Engineering*, 59:3:161, March 1964.

Provides lighting installation data for a 76- by 48-foot pool located in a 110- by 80-foot building. Sketches that show the positioning of the lights are given. An average level of 75 foot-candles was provided at the pool surface. To facilitate maintenance all units located over the pool were installed using disconnecting and lowering hangers.

134. "PATCH" ABSORPTION OFFERS NEW POSSIBILITIES IN SOUND. *Swimming Pool Age*, 34:9:64, September 1960.

Discusses the 13½-inch-square, 2½-inch-thick, cellular glass "patch" which absorbs sound. Holes 1⁄16 inch in diameter are punched into both back and front surfaces of the "patch." The unit is mounted on four pads so that it sits out ½ inch from the wall or ceiling, thus creating the effect of a resonant chamber. "Sound-conditioning" can be achieved by scattering the "patches" around various surfaces.

135. POOL NOISE CUT BY HALF. *Swimming Pool Age*, 36:4:58, April 1962.

After careful study of available treatment materials, glass foam unit absorbers were used to reduce noise in an indoor pool in Johnson City, Tenn. By installing 375 units on three walls, the ceiling, and vertical surfaces of exposed beams the noise and reverberation level was cut to about half its former level.

136. A SOLAR HEATED SWIMMING POOL. *Heating*, 21:164:231, August 1959.

Presents details of a method used for solar heating swimming pool water at an outdoor pool. A pipe collection system was utilized with the heat collector consisting of 1-inch iron pipe supported in an L-shaped wooden frame. The inner surfaces of the wooden boards were covered with aluminum foil and the frame is closed on the outside by transparent plastic sheeting. The outer surface of the pipe was painted black. It was found that a temperature rise of 10° to 20° F. could be obtained through the collector system when filling the pool with well water at a temperature of 52° F.

137. SOLAR HEATING FOR A SMALL SWIMMING POOL. *Heating*, 23:190:339, October 1961.

Describes the system used to solar heat the water in a portable, 25- x 17-foot swimming pool. The heat collector utilizes a flat-plate collector with copper "tube-in-strip" heat-absorbing elements. The "tube-in-strip" is sheets of metal having a number of parallel tubes within the sheet and of the same material as the sheet. The heat collector is connected to the water circulating system of the pool by a rubber hose and is able to raise the pool temperature from 3° to 8° F.

138. SOUND CONDITIONING CUTS NOISE PROBLEM IN INDOOR FACILITIES. *Swimming Pool Data and Reference Annual*, 32:32, 1965.

Swimming pools have always presented a special problem in noise control because of the ever present moisture and dampness. Perforated asbestos board and glass fiber tile offer highly efficient sound control even in the dampest interiors, without damage to the installation or to its sound control function. Because clogging of the surface openings of the acoustical tiles will decrease their porosity and therefore their sound-absorbing ability, it is important that these openings be kept free of foreign matter.

139. A STUDY OF LIGHT DISTRIBUTION FROM SUBMERSIBLE LIGHTING DEVICES. *Swimming Pool Age*, 35:4:22, April 1961.

Reports the results of an intensive series of tests on underwater lighting and lighting devices. A set of footcandle distribution curves is given for each of six types of lights tested for underwater lighting ability. Tests of the effects of varying depths on lighting revealed that, within limits, the deeper a light is placed the more light it puts out.

140. TODAY'S POOL HEATERS. *Swimming Pool Age*, 32:11:76, November 1958.

Different models of direct and indirect pool heaters are described. It is noted that the majority of manufacturers now make direct heaters. The basic problems of swimming pool heaters (scaling, condensation, and corrosion) have largely been overcome. The two ways to size pool heaters, the volume method and the area method, are illustrated by the use of examples.

Baker, William O.

141. SWIMMING POOL HEATERS AND THEIR OPERATION. *Swimming Pool Data and Reference Annual*, 29:104, 1961.

Discusses the principles of pool heater operation. Points out that it is imperative that a pool heater be equipped with an aqua-stat which will control the heater relative to desired pool temperature. Includes tables of "what to look for," "why did this happen," and "what to do" for the following problems: When a scale has formed in one or more of the tubes in the heater; when flames are coming out of the sides of the heater; when the heater will not come one; and when the heater will not heat pool water to the desired temperature.

Barrett, J. W.

142. CONDENSATION CONTROL DESIGN FOR AN INDOOR HEATED POOL. *Air Conditioning, Heating, and Ventilating*, 55:10:79, October 1958.

Reviews the design procedure followed to control condensation in a 46- x 14½ x 7½-foot natatorium. Points out that the initial design step is to determine the inside surface temperatures of the wall, roof, and windows in order to recommend modifications or changes in proposed building materials to minimize surface condensation. The ventilating system provided used 100 per cent outdoor air. Schematic sketches of the ventilation and pool heating system are provided.

Bell, L. M. T.

143. THE PREVENTION OF HEAT LOSSES FROM OPEN AIR SWIMMING POOLS. *Heating*, 32:187:229, July 1961.

Investigations were carried out to determine the effect of plastic swimming pool covers on the heat loss from a heated outdoor swimming pool. The covers were arranged to float on the water surface, were sunk under the surface to several depths, and some were airborne, to a height of 2-3 feet above the surface. Plastic covers floating on a cushion of air above the surface of the pool were found to maintain the average temperature of the water approximately 10° F. higher than if the covers were absent.

Cribb, Lieutenant M.

144. SOLAR HEATING FOR A LARGE SWIMMING POOL. *Heating*, 25:209:156, May 1963.

Gives full construction details for a solar heating unit used to heat a 100- x 34-foot open air swimming pool. The heating panels were fabricated of copper with parallel tubes. A graph is given showing daily maximum and minimum air temerature, hours of sunshine each day, and pool temperature from the end of May until October.

Daley, Robert E.; and Bishop, Walter P.

145. CONDENSATION PROBLEM SOLVED WITH NEW METHOD FOR SWIMMING POOL DESIGN, PART I AND PART II. *Air Conditioning, Heating, and Ventilating*, 58:5:81, May 1961; 58:10:63, October 1961.

To simplify calculations in designing heating and ventilation systems for indoor heated pools, a series of tables and charts is presented. The use of the charts and tables is discussed and sample problems are given illustrating their use. Factors affecting condensation are reviewed.

Doughty, Donald L.

146. "GROUND TO SAFETY." *Swimming Pool Age*, 35:3:62, March 1961.

Outlines a procedure for installing underwater lights in a swimming pool to help eliminate the possibility of electrocution of swimmers. In addition to properly grounded lights, the author recommends that the circuit for underwater lighting have a fuse rated at a capacity no larger than the size of the light, so that the fuse will blow quickly in the event trouble does develop.

Dowden, Alfred L.

147. KEEPING POOLS SAFE FROM ELECTRICAL SHOCK HAZARDS. *Swimming Pool Age*, 35:8:56, August 1961.

Presents principles of electrical safety in connection with the exposure to electric shock that pools might present. The author recommends the National Electric Code be followed when installing electrical equipment in swimming pools.

Hans, Lawrence E.

148. THE POOL AT NIGHT: HOW TO PLAN THE BEST AND SAFEST LIGHTING. *Swimming Pool Age*, 36:1:76, January 1962.

Discusses the advantages of color-correcting mercury vapor floodlights over incandescent lights including: 67 per cent less power is needed; longer life; less standards needed; eliminates harsh glare. Outlines the mercury vapor floodlighting system at a swimming pool in Corpus Christi, Tex.

Jacobi, Peter P.

149. NEW SCHOOL POOL SOLVES ECHO PROBLEM. *Swimming Pool Age*, 38:1:45, January 1964.

Monticello College in Alton, Ill., solved their swimming pool echo problem by installing a grid pattern of enameled brick—backed by an acoustical blanket — covering all or parts of three walls of the pool chamber. The ceiling is of pierced plastic squares at varying heights to reduce reverberation possibilities.

Karns, E. B.

150. HOW TO LIGHT A POOL. *Swimming Pool Age*, 39:6:14, June 1965.

Details installation data and recommended standards for underwater lighting of swimming and wading pools. A typical layout is given for lighting a bathing beach along with recommended equipment for this type of lighting.

Koch, Harold V.

151. POOL HEATING AND THE INDIRECT POOL HEATER. *Swimming Pool Data and Reference Annual*, 31:104, 1964.

Discusses combustion equipment, boiler construction, accessories and controls, service, and sizing of both the gas- and oil-fired indirect pool heaters. The indirect heater has been able to overcome the following problems encountered in heater design: (1) rapid scale formation and obstruction or failure on the heating surfaces; (2) severe and rapid corrosion on the water side of the heating surface; (3) large amounts of condensation forming on the fire side of the heating surfaces.

Martin, Vincent R.

152. ELECTRIC UNITS HAVE A NUMBER OF ADVANTAGES. *Swimming Pool Data and Reference Annual*, 33:43, 1966.

Discusses installation and sizing of electric pool heaters. The advantages of the electric pool heaters are principally in convenience, lower maintenance costs, and more flexibility as to location.

Matson, Maury

153. INGENIOUS DEVICE COOLS TEPID WATER. *Swimming Pool Age*, 31:8:30, August 1957.

In order to lower the temperature of warm water in a recirculating pool caused by hot weather, an aeration system was employed. The system of five spray nozzles on a header pipe was able to lower the pool water temperature about 10°.

National Swimming Pool Institute

154. NSPI PRESENTS NEW HEATER-SIZING DATA. *Swimming Pool Age*, 40:9:20, September 1966.

A suggested sizing chart for pool heaters developed by NSPI is presented. The chart concentrates on the size of heater necessary to maintain a given temperature differential. Instructions are given for using the chart to select a heater which will maintain the pool at the desired temperature.

Passman, Irving

155. CONSIDER MERCURY VAPOR FLOODLIGHTS. *Park Maintenance*, 16:3:42, March 1963.

Reviews the advantages claimed for mercury vapor floodlights to illuminate a swimming pool and the surrounding area. This type of lighting provides more adequate illumination of the entire pool area, costs less to operate, and has a rated life of 16,000 hours.

Pinkhus, Sheldon

156. ELECTRICAL HAZARDS IN SWIMMING POOLS. *Swimming Pool Age*, 36:6:42, June 1962.

Describes a new safety device that protects against electrical hazards in swimming pools by instantaneously shutting off power when a current leakage occurs. One of the main advantages claimed for the new device is its ease of installation. It can be installed in existing pools as well as those under construction.

Sperber, Philip

157. FOOLPROOF ELECTRICAL SAFETY IN EVERY POOL. *Swimming Pool Age*, 37:4:14, April 1963.

Reviews studies of defective swimming pool lights which revealed that approximately 85 per cent of the facilities were occasioned by water entry through the cord. It was also found that deck boxes were susceptible to water and moisture. A process has been developed for encapsulating the wiring chamber of lights and splices in deck boxes with epoxy resin to exclude moisture. A description is given of the installation procedure used at a pool in New Jersey to waterproof pool lights and deck boxes.

Synder, Donald H.

158. How To Prevent Condensation in Heating This Pool? *Heating, Piping and Air Conditioning,* 35:11:126, November 1963.

Outlines how condensation was prevented in an indoor residential pool by employing a makeup air unit to heat outside air and mix it with recirculated air; the mixture being discharged on the glass areas.

Taylor, W. P.; and Arthur, R. J., Sr.

159. Pool Lighting at 120 Volts. *Electrical Construction and Maintenance,* 60:12:100, December 1961.

Reports an investigation to determine the causes of and remedies for electric shock in swimming pools with submerged 120-volt lighting. The test results indicated that: (1) dangerous potentials can exist and currents generally considered lethal can be encountered by a swimmer near a defective 120-volt underwater light; (2) underwater lighting can remain safe even though water may come in contact with live parts, provided all metallic non-current-carrying parts of the wiring are effectively grounded and properly maintained.

Taylor, W. W.

160. The Sound Barrier Falls to a Whisper. *Swimming Pool Data and Reference Annual,* 33:5, 1966.

To solve noise problems in an indoor swimming pool an acoustical correction material, called a "patch" absorber, can be used. The "patch" is a panel made completely of glass foam and measures 13½ inches square by 2 inches thick. It absorbs and deflects sound on all six sides of the panel. The material is called a "patch" absorber because it can be mounted anywhere on walls and ceilings and in any pattern to achieve the desired acoustical control in big and small areas.

Tibbet, William M.

161. The Effect of Pool Heaters on Circulation. *Swimming Pool Age,* 32:7:44, July 1958.

After the Los Angeles City Health Department required the installation of flow meters in public and semi-public swimming pools, it was found that flow rates in many pools were dropping significantly below that required for proper circulation. In many instances, the heater installation together with the adjustment of the heater bypass valve was causing the difficulty. Some corrective measures are: (1) check heater piping for proper size; (2) provide a circulating pump with enough capacity to handle the heater as well as the rest of the circulating system; (3) the bypass valve should be designed so that it cannot be completely closed.

Timm, E. E.

162. The Role of Electrical Epoxy Resin in Pool Safety. *Swimming Pool Age,* 37:7:16, July 1963.

Discusses the use of epoxy resin for moisture-proofing swimming pool deck boxes and underwater lights. The epoxy which is liquid after being mixed with an activator is poured into the deck box or underwater light. In the light, the resin enters the core of the cable and cures around the outside to keep moisture out. In the deck box, the resin covers the bare wires and, by encapsulating, insulates the wire and blocks out moisture and water.

Watt, J. H.

163. Around-the-Clock Safety Systems. *Electrical Construction and Maintenance,* 61:10:119, October 1962.

Describes the operation and installation of an electronic pool alarm on a residential pool to detect unauthorized pool users. The general wiring of the 12-volt underwater lighting of the same residential pool is outlined. A sketch shows the complete wiring system.

Whittell, A., Jr.

164. Radiant Heating for Swimming Pools. *Swimming Pool Age,* 33:12:44, December 1959.

A municipal pool in Oakland, Calif., was one of the first public pools to be radiantly heated. Several thousand feet of copper pipe coils were embedded in the concrete floor of the pool. As hot water is pumped continuously through the coils, they warm the concrete floor slab, which in turn transmits heat to water in the pool. The warm water rises, thus setting up a continuous circulation within the pool creating an even temperature at all points. About 2,000 pools in southern California have been heated radiantly since the Oakland pool. From the experience gained with these pools, the author lists nine suggestions to aid in the design and construction of radiantly heated pools.

Wyard, Jack

165. The Whys, Wherefores of Pool Water Heating. *Swimming Pool Age,* 40:1:101, January 1966.

Discuses the features of the multijet, central heating boiler, indirect, direct heating, and radiant heating types of swimming pool heating systems. The total cost of heating a pool is the sum of three main items: depreciation, maintenance cost, and fuel cost. These three items are discussed and examples showing how to compute fuel costs are given. Installation recommendations concerning air supply clearance, and piping are outlined.

166. THE WHY'S, WHEREFORES OF POOL WATER HEATING. *Swimming Pool Data and Reference Annual,* 33:38, 1966.

See item No. 165.

Yerges, Lyle

167. HOW TO SOUND CONDITION YOUR POOL. *Swimming Pool Age,* 31:10:32, October 1957.

Suggestions are given on preinstallation preparation, installation, and maintenance of acoustical materials including perforated asbestos board and cork. It is emphasized that maintenance is equal in importance to the proper selection and installation of acoustical materials.

E. DESIGN AND CONSTRUCTION—Recirculation System

Anonymous

168. ELECTRONIC CONTROL KEEPS POOL FILLED TO OVERFLOW GUTTER. *Swimming Pool Age,* 31:10:29, October 1957.

Outlines the design of an electronic control that utilizes a pressure sensitive switch to keep the pool water level at the overflow gutter. The pressure-operated mercury switch measures the water level in the pool and controls the addition of makeup water from a tank located below pool level in the filter room.

169. PLASTIC PIPE FOR SWIMMING POOLS. *Swimming Pool Age,* 31:9:24, September 1957.

The advantages claimed for plastic pipe in swimming pool construction are reviewed. Extrusion methods and underground installation procedures for plastic pipe are discussed. The installation of a 22- x 24-foot motel pool recirculation system using plastic pipe is described.

170. THE SWIMMING POOL PUMP. *Swimming Pool Age,* 31:6:32, June 1957.

The operation of a centrifugal pump is reviewed, and the self-priming centrifugal pump and the straight centrifugal pump are compared. Suggestions are given on selecting a pump, installing, maintaining, storing and trouble shooting the pump.

Bosico, Tony; and DiDomizio, George

171. HOW TOTAL IS YOUR TURNOVER? *Swimming Pool Age,* 36:11:14, November 1962.

The Silver Side Swim Club Pool in Silverside, Del., employs vacuum surface skimmers and floor return inlets in the pool recirculation system. The authors report that 95 per cent of the total filter capacity is pulled from the skimmers while the other 5 per cent is removed from two main drains set in the diving well. The arrangement of the floor return inlets provide a turbulence in the water thereby reducing the debris settling on the pool floor.

Browne, W. L.; and Weir, Allan A.

172. A REPORT ON THE SURFACE SKIMMER. *Swimming Pool Age,* 33:6:38, June 1959.

A study of three swimming pools was conducted to determine: related effect of different types of skimming or gutters on sanitation; the effectiveness of chlorination at various water depths; water clarity under various types of skimming or gutter action. The pools included one with gutters draining to waste, one with recirculating gutters in the ends of the pool, and one with a skimmer. The authors conclude: (1) Each of the three type of pools, with proper management and use of chemicals, produced satisfactory results; (2) Improved water clarity was evident with automatic continuous skimmer-type pools; (3) Chlorination was effective at virtually all depths in the pools.

Culleton, Jack T.

173. SOLVING PUMP PROBLEMS. *Swimming Pool Age,* 34:1:34, January 1960.

With the use of five head-capacity performance curves, the author shows how to compute the size of pump for a sand and gravel filter and a pressure diatomaceous earth filter. Discusses the possible pump problems of a clogged impeller, a leaky seal, bad ball bearings, and a bad motor.

Curlett, Stanley L.

174. A SHORT COURSE ON HYDRAULICS, PART I AND PART II. *Swimming Pool Age,* 38:4:36, April 1964; 38:5:28, May 1964.

To aid in sizing pumps and pipes, the different kinds of head, including static head, total dynamic head, friction head, and suction head, are discussed and examples for computing each are given. It is also shown how velocity can be used as an indicator of pipe sizes. The procedure to follow in selecting a pump that will meet the necessary volume and head requirements is outlined. In discussing pump curves it is noted that pumps with flatter head-flow curves are usually more efficient for sand filters, while those with steeper head-flow curves are usually selected for diatomaceous earth filters to provide for the greater ranges of pressure differential.

Doughty, Donald L.

175. THE DESIGN OF THE HYDRAULIC SYSTEM. *Swimming Pool Data and Reference Annual,* 31:57, 1964.

To aid in designing the hydraulic portion of the swimming pool, curves showing the relationship between various fundamental variables are given, and the specific design of the return system is discussed in detail. "Rules of thumb" are given for application of skimmers and for line sizing.

Griffin, Attmore E.

176. WHAT YOU SHOULD KNOW ABOUT POOLS AND PUMPS. *Swimming Pool Age,* 33:11:109, November 1959.

Discusses why the selection of an adequate water pump and chemical solution pump is essential to good pool operation. It is recommended that only the best grade and adequately sized recirculation pumps, and the best chemical pumps available be used.

177. WHAT YOU SHOULD KNOW ABOUT POOLS AND PUMPS. *Swimming Pool Data and Reference Annual,* 28:180, 1960.

See item No. 176.

Hodder, B. H.; and Palmer, G. H.

178. CIRCULATION AND SKIMMING EFFICIENCY. *Swimming Pool Data and Reference Annual,* 30:78, 1962.

This study was undertaken to determine what water inlet and outlet arrangements will provide the best combination of water circulation pattern, disinfection, chemical mixing, and skimming efficiency in the pool. The most desirable features are tabulated, and the results are given for full and scale model investigation of relative efficiencies and various arrangements. A scheme is recommended which embodies these features and details of an efficient skimmer of simple design are given.

Larkin, Kenneth H.

179. MODERN POOL DESIGN: THE CASE OF "TOP WATER" OR CLOSED RECIRCULATION. *Parks and Recreation,* 40:4:6, April 1957.

Discusses closed recirculation in a swimming pool where the gutter overflow water is returned to the filter thus keeping the pool continuously full. The design of pool overflow gutters, their drainage system, and the use of skimmers on large pools are considered.

Lowenstein, J. G.

180. ECONOMICAL SIZING OF PIPE. *Swimming Pool Age,* 34:4:110, April 1960.

Presents a chart that is set up to give the most economic pipe size directly for any given flow of water. It is based on the theory that the actual cost of operating pumping equipment is directly proportional to pipe size, while the functional cost of pipe and fittings, amortization, maintenance, and pump efficiency are inversely proportional to pipe diameter.

McLaughlin, Richard M.

181. THE PROBLEM OF DIRT RETENTION AND RECIRCULATION. *Swimming Pool Data and Reference Annual,* 30:156, 1962.

A review and discussion of swimming pool recirculation systems including the sources of dirt, function of recirculation systems, and the equipment that composes a recirculation system.

Meslin, Jerry

182. HOW TO DETERMINE GALLONAGE; RATE OF FLOW. *Swimming Pool Age,* 32:8:52, August 1958.

In order to find the required rate of flow through the filters, the number of gallons of water in the the pool must be known. This article explains, with simple formulas, how to determine pool gallonage and filter rate of flow.

Nash, Floyd

183. PUMPS, VALVES, PIPES. *Swimming Pool Data and Reference Annual,* 30:168, 1962.

Discussion of the pumps, valves, and pipes that compose a swimming pool recirculation system. Tells about the operation and problems of each plus giving tips on buying these items.

Smith, Harley

184. PROPER PUMP IS ESSENTIAL FOR EFFICIENT FILTERING. *Swimming Pool Data and Reference Annual,* 32:62, 1965.

Semiopen and semiclosed impellers for centrifugal pumps are described and the advantages and disadvantages of each type are listed. Pump curves, cavitation, pump head characteristics, and pump installation are discussed. Possible pump problems include: (1) pump runs but does not pump; (2) pump is noisy; (3) pump will not pump or at best, pumps only a little; and (4) pump will not run. Some of the possible causes of these pump problems are listed.

F. OPERATION AND MAINTENANCE

Anonymous

185. AUTOMATED POOL. *Swimming Pool Age,* 39:1:109, January 1965.

Describes the systems installed to provide automatic operation of a public pool in North New

Hyde Park, N. Y. The control panel permits one man on an 8-hour shift to control the operation of the pool. One of the unique features is an automatic control system that allows the pool water level to be maintained precisely at a fixed point, about ⅜ inch above the lip of the coping stone. This is done by means of a holding tank for the storage of excess water when the bathing load in the pool is high.

186. AUTOMATION, 1964. *Swimming Pool Data and Reference Annual,* 32:6, 1965.

See item No. 185.

187. CAN RECOMMENDED STANDARDS BE ENFORCED? *Swimming Pool Age,* 33:4:52, April 1959.

A study of 19 private swimming pools was undertaken to determine the efficiency of the pool operation. On the basis of the study it was recommended that: private swimming pool owners run their filtering systems a minimum of 12 hours per day; the filter be started at least 5 or 6 hours before anyone used the pool; and chlorine residual between 0.3 and 1.0 ppm be maintained.

188. A CHECK LIST FOR WINTERIZING A POOL. *Swimming Pool Data and Reference Annual,* 32:119, 1965.

Provides a check list for winterizing pools in mild and severe climates.

189. "CLOSING" YOUR POOL FOR THE SEASON. *Swimming Pool Age,* 32:9:36, September 1958.

Carrying out the proper maintenance procedures when closing down a pool at the end of a season is of vital importance if the pool and equipment are to be in good condition at the beginning of the next swimming season. Tips are given on winter preparation of filters, chlorinating equipment, pumps, drains, and inlets.

190. CONSERVE WATER WHEN YOU WINTERIZE YOUR POOL. *Park Maintenance,* 19:3:46, March 1966.

In addition to the advantages in conserving water and the savings in not having to purchase or pump it, retaining water in the pool year-round can also provide a prime source of water for fighting fires in outlying areas. To prepare the pool for winter, it should be covered, all supply valves should be shut off, pipes and equipment should be completely drained, filters should be cleaned, and all electric power should be turned off.

191. A PUMP MAINTENANCE TIMETABLE. *Swimming Pool Age,* 31:8:27, August 1957.

Advice is given on the care of a swimming pool pump including when and how to service it and where to look when trouble occurs. A routine maintenance schedule is recommended to get the best service out of any pumping equipment.

192. SOME COMMON POOL PROBLEMS. *Swimming Pool Age,* 38:1:108, January 1964.

Gives possible remedies for some common pool problems such as: pool water is cloudy or green; pool water is black; blue deposit on interior pool surface; and algae forming in the pool.

193. WINTERIZING POOLS. *Swimming Pool Data and Reference Annual,* 30:202C, 1962.

A brief review of some duties that must be performed to prepare a swimming pool for the winter season.

Asher, William M.

194. PROPER CARE CAN LENGTHEN ELECTRIC PUMP MOTOR LIFE. *Swimming Pool Age,* 40:4:41, April 1966.

Some maintenance precautions for electric motors are suggested. Protecting motors from heat, moisture, and dirt can aid in prolonging pump life as well as reducing repair expense.

Baylor, Robert C.

195. SET PROCEDURE OFFERED FOR CLEANING RESTROOMS. *Swimming Pool Age,* 39:11:32, November 1965.

These suggestions for cleaning and disinfecting public restrooms can cut maintenance costs and provide patrons with clean, odor-free facilities. Suggested procedures are also given for control of insects in and around buildings.

Beatie, Russel H.

196. A CLEAN, SAFE POOL, PART I AND PART II. *Swimming Pool Age,* 34:12:120, December 1960; 35:1:71, January 1961.

A review of practical information of value to the pool operator, including preparing the pool for opening, cleaning filters and chlorinators, sanitation, safety, winterizing, chemicals, pH, algae control, and electrolysis.

197. YOUR POOL MANUAL. *Swimming Pool Data and Reference Annual,* 29:130, 1961.

A review of recommended pool operation and maintenance practices including general pool operation procedure, the pool structure, pool equipment, pool chemicals, and pool problems.

Bickert, M. C.

198. HYDRAULICS: THEORY BEHIND OPERATION OF PUMPS. *Swimming Pool Age,* 40:1:53, January 1966.

Discusses the hydraulic theory behind the operation of centrifugal pumps. Cavitation occurs in a pump whenever it cannot get enough water from the suction line to satisfy its demand for water. To avoid cavitation problems, it is important to use ample size suction piping, to keep valves open, and to make certain that the hair catcher is kept clean.

Bohn, Paul M.

199. SWIMMING POOL OPERATION AND MAINTENANCE. *New Jersey Municipalities,* 43:6:18, June 1966.

Lists the personnel responsible for swimming pool operation and outlines their responsibilities. Suggestions are given for maintenance of the main and auxiliary pools, the filter and chlorine rooms, the bathhouse, and the pool grounds.

Bosico, Tony

200. FILTER LINE LEAKS. *Swimming Pool Data and Reference Annual,* 30:202B, 1962.

Simple methods are outlined for locating minor leaks in filter lines, skimmers, and the main drain using ink or dye. Tells briefly how the leaks may be repaired once they are located.

201. SPOTTING LEAKS IN FILTER LINES. *Swimming Pool Age,* 36:1:80, January 1962.

See item No. 200.

Clift, Hugh, Jr.

202. OPERATOR'S HANDBOOK. *Swimming Pool Age,* 32:12:40, December 1958.

Breaks care and maintenance of swimming pools into several classifications, which followed, will aid in assuring a well kept pool, with pure sparkling water, free from troublesome bacteria. The following sections of care and maintenance are discussed: (1) chlorination; (2) filtration; (3) flocculation; (4) pH control; (5) algae control; (6) testing; (7) footbaths; and (8) cleaning and sanitation.

Gallagher, Robert

203. A LOCAL HEALTH AUTHORITY EXAMINES POOL WATER CHEMISTRY. *Swimming Pool Age,* 34:10:38, October 1960.

Reviews the ortho-tolidine test for chlorine residual and the procedure used in a laboratory test of swimming pool water. The importance of a proper pool testing program is stressed.

Green, R. F., Jr.

204. PROPER MAINTENANCE AND REPAIR CAN PROLONG CHEMICAL FEEDER LIFE. *Swimming Pool Age,* 40:8:16, August 1966.

Procedures for mechanical service of chemical feeders are suggested including the motor, the cooling fan, the mechanical linkage, and the timer. Nonmechanical service requirements are presented to aid in preventing such feeder problems as clogging, blocking of the injection point, and deterioration of the feeder diaphragm.

Honsa, W. M.

205. SOME TIPS FOR POOL OPERATORS. *Swimming Pool Age,* 36:1:144, January 1962.

Some tips on disinfection, filtration, and cleaning that will aid in keeping a swimming pool in a sanitary condition. Some suggestions are offered to prevent polluted matter from reaching the pool.

206. SOME TIPS FOR POOL OPERATORS. *Swimming Pool Data and Reference Annual,* 30:174, 1962.

See item No. 205

Hubbard, Lloyd S.

207. STAINING SHOWS FLOW PATTERNS. *Swimming Pool Age,* 39:1:126, January 1965.

Outlines a simple method for studying the flow patterns and mixing characteristics of a recirculated swimming pool using a common analine dye, "crystal violet." Discusses the importance of the following factors upon distribution efficiency: turnover rate of the pool; quantity and location of inlets; volume of water per inlet; velocity of water escape at each inlet; and location of outlets.

LaMotte, Charles V. B.

208. WHY TEST POOL WATER? *Swimming Pool Data and Reference Annual,* 29:93, 1961.

Reports test methods for chlorine, chlorinated cyanurates, bromine, iodine, ionized silver, pH, total alkalinity, copper sulfate, iron, and hardness. Five key rules for the proper use and care of pool test kits are stressed.

Los Angeles City Health Department

209. A MANUAL FOR POOL OPERATORS. *Swimming Pool Age,* 31:11:66, November 1957.

General guidelines for pool operators on the operation and maintenance of a swimming pool. Among the items covered are filtration, disinfection, algae control, and safety.

Martin, Frank

210. YOUR JOB AS A POOL OPERATOR. *Swimming Pool Age*, 33:2:30, February 1959.

An outline of the responsibilities of swimming pool management. Supervision of employees, operation and maintenance of the pool, accident prevention, and swimming education are a few of the duties of a pool operator.

211. YOUR JOB AS A POOL OPERATOR. *Swimming Pool Data and Reference Annual*, 28:194, 1960.

See item No. 210.

Meslin, Jerry

212. HOW TO PROPERLY HANDLE GAS CHLORINE TANKS. *Swimming Pool Age*, 38:9:70, September 1964.

Among the ways chlorine fumes can escape from gas chlorine tanks are: a pinhole puncture in old corroded tanks; failure to use a new lead gasket when coupling the tank; and uncoupling a cylinder without closing its valve. Competent pool personnel can insure the public against chlorine hazards. The pool manager should be in complete charge of the chlorine dispensing equipment and should be thoroughly educated on the subject through appropriate training.

213. HOW TO SENSE PUMP, MOTOR TROUBLE. *Swimming Pool Age*, 40:9:22, September 1966.

Explains how a pool operator can detect motor and pump trouble such as cavitation, bad bearings, and overheating by using his sense of hearing touch, smell, and sight. Emphasis is placed on the periodic reading of the filter gauges, rate of flow meter, and pump suction gauge to insure the proper operation of the pool equipment.

214. OPERATION AND MAINTENANCE. *Swimming Pool Age*, 31:1:49, January 1957.

Outlines the operation and purpose of water and chlorine pressure gauges on a solution-feed chlorinator, the vacuum gauge on a pump, the differential pressure gauges on the influent and effluent sides of a filter, and the gauge that measures the amount of water flowing through the system. The relation of these gauges to the proper operation of a swimming pool is emphasized.

215. POOL OPERATOR SHOWS HOW TO SAVE WATER. *Swimming Pool Data and Reference Annual*, 33:103, 1966.

A few ways to save water in the operation of a pool are: recirculate the gutter overflow, drain the pool as infrequently as possible, and eliminate leaks in piping. A pool manager for the city of Miami discusses how these, along with some other methods, can help conserve the use of water in swimming pools.

National Pool Equipment Co.

216. WINTER MAINTENANCE AND POOL CARE. *Swimming Pool Data and Reference Annual*, 28:142, 1960.

A series of suggestions to assist in protecting swimming pools against the winter elements. Items that need care include deck equipment, filter equipment, and underwater lights. Suggests that the pool be left full to prevent the floor from heaving or buckling and that logs be placed in the water to prevent ice from exerting undue pressure against the pool walls.

Oswald, Vivian

217. IMPORTANT WINTER POOL CHORES. *Swimming Pool Data and Reference Annual*, 32:114, 1965.

Suggestions on what to do to safeguard your pool and equipment during winter. Points out the importance of completely draining piping and filter equipment to prevent damage by freezing.

Ottinger, George

218. HOME POOL CARE. *Swimming Pool Age*, 34:12:46, December 1960.

Presents tips to pool owners on maintenance and care of a home swimming pool. It is noted that a little work on the pool every day will help prevent a buildup of problems that lead to excessive maintenance and repair bills. Stresses the importance of having the pool supervised if the owner goes on vacation.

Schillmoller, C. M.

219. CORROSION CLINIC. *Swimming Pool Age*, 40:5:45, May 1966.

Eleven questions and answers on galvanic corrosion are presented. The first four questions are on theory and the following seven questions deal with practical aspects of galvanic corrosion in swimming pools.

State Board of Health, Topeka, Kans.

220. CORROSION AND FREEZING WATER. *Swimming Pool Age*, 35:10:16, October 1961.

Suggests how to prepare recirculation equipment, inside building, pool and accessories, and exterior grounds and equipment for the winter season.

221. CORROSION AND FREEZING WATER. *Swimming Pool Data and Reference Annual*, 30:123, 1962.

See item No. 220.

Stern, James F.

222. How Our State Courts are Viewing Cases Arising from Suits Against Club, Hotel Pool Operators. *Swimming Pool Age,* 39:12:26, December 1965.

Cites court cases which have resulted from an injury or drowning at a club or hotel pool. Emphasizes that the pool operator must use ordinary and reasonable precautions to prevent guests or patrons from being drowned or injured by his own acts or by foreseeable acts of others.

Swan, Arthur A.

223. Pool Pumps and Optimum Performance. Swimming Pool Age, 37:1:124, January 1963.

Self-priming centrifugal pumps may fail to prime if there is air in the suction piping or casing. Some of the possible causes may be an air leak at a poorly made pipe joint, poor hose connection from a chlorinating device, or improperly fitted hair and lint catcher cover. Cavitation, which may cause pitting in the pump, may be caused by an obstruction in the suction piping or a partially plugged impeller channel.

224. Pool Pumps and Optimum Performance. *Swimming Pool Data and Reference Annual,* 31:66, 1964.

See item No. 223.

Thomas, David G.

225. Coach Puzzles Over Emerald Green Pool. *Swimming Pool Age,* 38:6:40, June 1964.

In his efforts to change his green pool water blue, the author tried many trial-and-error experiments, including lowering and raising the pH and chlorine residual, adding copper sulfate, and adding diatomaceous earth to the filters instead of alum. Clear blue water was finally obtained by limiting the pH to 7.0 or below with a chlorine residual of 0.3 ppm.

Treene, William E.

226. Proper Pump Maintenance. *Swimming Pool Age,* 38:6:10, June 1964.

Some suggestions are given on pump installation and starting the pump. Tips are given for troubleshooting a pump when the pump will not prime, when the pump is noisy, and when the flow is low.

U.S. Department of Health, Education, and Welfare

227. Counting Bacteria by the Membrane Filter Method. *Swimming Pool Data and Reference Annual,* 28:120, 1960.

Excerpts from the U.S. DHEW's publication "Descriptive Guide: The Membrane Filter." Points out the easy way to determine the number and type of bacteria in water.

White, Robert B.

228. Pool Records: Their Importance. *Swimming Pool Age,* 32:10:40, October 1958.

Every public and semi-public pool operator should be charged, among his other various duties, with the job of keeping accurate records of his pool. A good overall set of records should include: operation reports, accidents, attendance, and inspection.

Whitmer, Charles

229. What To Do About Winterizing Pools. *Swimming Pool Age,* 33:10:55, October 1959.

Suggestions are given on how to prepare a swimming pool for the winter season to prevent damage to the pool and minimize work in opening the pool in the spring. It is noted, that if possible, the filter room should be heated to prevent frost breaks, and dampness will be kept out.

230. Winter Can Damage Pools: What To Do. *Swimming Pool Age,* 34:10:48, October 1960.

Tips on preparing the pool for winter and opening the pool in the spring, including cleaning filters and filter room equipment, repairing cracks, and painting the pool and equipment. The author recommends leaving water in the pool during the winter because it will counteract the pressure of frozen ground on the pool walls.

Zebon, Peter D.; and Jackson, Thomas M.

231. Tips on Maintenance of Diatomite Filters. *Park Maintenance,* 19:3:59, March 1966.

Discusses how to solve some common problems encountered in operation of a diatomaceous earth filter. It is suggested that for several days a log be kept showing filter pump pressure reading in relation to cycle times. This will help establish a median for the best filter cycle operation of the individual pool.

G. WATER TREATMENT—General

Anonymous

232. Clean Water for Swimming Pools. *Air Conditioning, Heating, and Ventilating,* 59:6:65, June 1962.

Reviews some of the current practices and points out new trends in the hydraulic design of a swimming pool, disinfection, algae control, and use of conditioners such as sulfamic acid.

233. PURE WATER: HOW EFFECTIVE ARE THE PRESENT PROCEDURES. *Swimming Pool Data and Reference Annual,* 29:28, 1961.

A guide of disinfectants and algicides for swimming pools based on experience in pools and in the laboratory. Disinfectants discussed are the halogens, with emphasis on chlorine, the chlorinated cyanuric acids, and electronic purifying devices such as ultra-violet purification and ozone treatment. Quats and copper sulfate are two of the algicides discussed.

Barr, J. C.

234. "IDENTICAL" POOLS HAVE DIFFERENT PROBLEEMS. *Swimming Pool Age,* 37:4: 13, April 1963.

Describes the effect of pool coating, filter, pool location, bathing load, and weather on the quality of swimming pool water. Compares a painted concrete pool with a steel-tanked diatomaceous earth filter and another pool of the same size and construction with a concrete-tanked sand and gravel filter showing that the former required 2 gallons of muratic to reduce pH from 8.4-8.6 to 7.4 while the latter required 22 gallons of muratic acid to reduce the pH to 7.6.

Beeler, Lee

235. THE MINERAL CONTENT OF POOL WATER. *Swimming Pool Age,* 36:9:18, September 1962.

Discusses calcium salts, magnesium salts, iron salts, manganese salts, and sodium salts. As the pH rises in a pool, calcium salts will form a deposit and magnesium precipitates as a gumming flocculent. Both of these salts can be removed by softening by the zeolite process. Iron, which colors the water, can be removed by oxidation and filtration. Manganese may be partially removed by zeolite exchange and the balance by oxidation and filtration. Sodium salts are not objectionable in pools except in extreme concentrations.

236. POOL MINERALS. *Swimming Pool Data and Reference Annual,* 31:150, 1964.

See item No. 235.

Bell, Lloyd C.

237. DON'T LET YOUR pH SEE-SAW. *Swimming Pool Age,* 35:4:28, April 1962.

High alkalinity or high pH will retard the chemical activity of free chlorine residuals as bactericides and algicides. Low pH will cause eye irritation in swimmers. Therefore, it is necessary to maintain balanced conditions in the pool. When chlorine gas is used for disinfection its acidic influence to water must be neutralized by the addition of soda ash. With sodium or calcium hypochlorites, acid must be added to neutralize any alkali influence.

238. pH AND ALKALINITY CONTROL. *Swimming Pool Data and Reference Annual,* 38:60, 1964.

See item No. 237.

Berens, William

239. WHAT TO DO ABOUT POOL WATER "DEAD SPOTS." *Swimming Pool Age,* 35:4:51, April 1961.

Discusses swimming pool water "dead spots" which are water pockets that do not work through the filter often enough to be properly cleansed or treated by disinfection equipment. Suggests corrective treatment such as occasional agitation of the water by hand to disperse slow-moving pockets of water, modification of adjustable inlet settings from time to time, and frequent supplemental hand chemical treatment.

Brown, Judson G.

240. CONTROL POOL FOR COMFORT. *Swimming Pool Age,* 39:2:58, February 1965.

The author suggests that since mild salt water is used as an eyewash and does not irritate the eyes, swimming pool water should be adjusted to a content close to 0.9 percent salt. It is pointed out that careful consideration must be given to pool construction materials because some metals are unsatisfactory for salt water service.

Bullard, E. Jack

241. WATER TREATMENT CHEMICALS. *Swimming Pool Data and Reference Annual,* 30:71, 1962.

A discussion of: sodium hypochlorite, calcium hypochlorite, chlorine gas, chlorinated cyanurates, and bromine for swimming pool disinfection; soda ash, muratic, sulphuric, and sulfamic acids for pH control; and copper sulfate for algae control.

Crabill, M. B.; and Lyman, E. D.

242. EYE IRRITATION ASSOCIATED WITH SWIMMING. *The Nebraska State Medical Journal,* 48:8: 454, August 1963.

In this review of eye irritation of swimming pool patrons, it is pointed out that chloramines are the most important factors causing eye irritation. Suggests that by adjusting pH and free chlorine levels eye irritation can be held to a minimum.

Eich, Henry F.; and Lightfoot, Richard O.

243. 12 CHEMICALS USED TO TREAT POOL WATER. *Swimming Pool Age,* 39:1:74. January 1965.

Discusses the effectiveness of cyanurates, hypochlorites, hydantion, bromine, silver, iodine, and ultraviolet light as swimming pool disinfectants. Quaternary ammonium compounds and copper compounds are rated as to their ability to kill algae. It is noted that the polyphosphates should not be used to reduce excessive amounts of calcium or iron in pool water that is filtered by a diatomaceous earth filter because the precipitate will cause almost complete stoppage of the filter in a short time.

244. TWELVE CHEMICALS USED IN TREATING POOL WATER. *Swimming Pool Data and Reference Annual,* 32:71, 1965.

See item No. 243.

Gladis, Albert

245. THE PROBLEM OF IRON IN POOL WATER SUPPLIES. *Swimming Pool Age,* 33:11:198, November 1959.

If iron is present in pool water supplies, the addition of chlorine may release it causing a brownish discoloration of the water. Iron in pool water can cause a false chlorine residual reading with a chlorine test kit and thus mislead the operator into believing he has a sufficient residual whereas he may not. Among the methods for removing iron from swimming pool waters are oxidizing filters, water softeners, neutralizers, and iron retention. The iron oxidizing filter and the water softener are both simple pieces of equipment that can be easily understood and maintained.

Griffin, Attmore E.

246. ACCURATE COLORIMETRIC DETERMINATION OF pH IN SWIMMING POOL WATER. *Public Works,* 90:3:163, March 1959.

Factors that may cause the colorimetric pH test to be inaccurate are reviewed. Points out that the greatest single influence on the colorimetric determination of pH is residual chlorine which tends to bleach the organic dyes used in the test. This inaccuracy can be solved by adding sodium thiosulfate to dechlorinate the sample.

247. THE FOUR CLASSIFICATIONS OF POOL CHEMICALS. *Swimming Pool Data and Reference Annual,* 32:82, 1965.

Discussion of five types of chemicals used in swimming pool treatment: disinfectants, algicides, coagulants, conditioners (acid-alkali stabilizers), and olifactants.

248. H_2O: THE OPERATOR AS WATER CHEMIST. *Swimming Pool Age,* 37:1:66, January 1963.

Reviews treatment methods that can be used to remove, modify, or control color, suspended matter, iron, manganese, algae, alkalinity, and pH. Chlorine is discussed as a pool water disinfectant and its chemical reactions in water are detailed.

249. WHAT YOU SHOULD KNOW ABOUT pH AND ALKALINITY. *Swimming Pool Age,* 34:12:135, December 1960.

With the aid of tables, the difference between pH and alkalinity is explained. The final result is that the pH value of water indicates a condition of the water, but does not measure the weight of alkalinity present.

Hays, Jim

250. THE IMPORTANCE OF pH CONTROL. *Swimming Pool Age,* 37:1:72, January 1963.

Briefly reviews what pH is and the importance of keeping proper pH balance in swimming pools. A short outline of the methods that can be used to adjust pH is given.

Hubbard, Lloyd S.

251. THREE STEPS TO CLEAN SAFE SWIMMING POOL WATER. *Parks and Recreation,* 47:7:304, July 1964.

The three basic controls (filtration, disinfection, pH control) which govern the quality of swimming pool water are reviewed and some of the elementary chemistry involved is examined. Shows how all three are interrelated and stresses the importance of maintaining these controls in proper balance to obtain swimming pool water of good quality.

Ingols, Robert S.

252. A CHEMIST'S VIEW OF WATER. *Swimming Pool Age,* 39:4:22, April 1965.

A comprehensive explanation of pH. The author suggests that since the normal pH of the human body is 7.3, the water in a swimming pool will be the least irritating when it is kept near pH 7.3.

253. QUALITY POOL WATER AND ALKALINITY. *Swimming Pool Age,* 38:12:42, December 1964.

Discusses the effect of alkalinity on swimming pool water. Scale is likely to form on piping and filters when both hardness and alkalinity are high. The scale will become severe if pH is allowed to rise at the same time.

Kiensle, Fred H.

254. MANY POOL FACTORS AFFECTED BY pH. *Swimming Pool Age,* 36:5:61, May 1962.

The effect of pH on pool water quality is discussed showing how coagulation, chlorine residual, algae, and basic carbonates are effected by fluctuating pH level. A pH level of 7.2-7.6 is recommended to provide balanced conditions in the pool.

255. SCALE AND pH CONTROL. *Swimming Pool Age,* 34:11:24, November 1960.

Points out that common types of scale are the carbonates, silicates, aluminates, sulfites of magnesium, calcium and iron, with calcium carbonates being the most common type of scale encountered in swimming pools. Discusses how control of the following five factors will help minimize scale: (1) total solids; (2) temperature; (3) pH; (4) calcium hardness; (5) total alkalinity.

Lightfoot, Richard O.

256. POOL CHEMISTRY: HOW TO BE AN EXPERT. *Swimming Pool Age,* 32:11:45, November 1958.

To take better advantage of the chemicals used in treating swimming pools, an understanding of their characteristics and effects is essential. The characteristics, effects, and basic chemical concepts of chlorine gas, sodium and calcium hypochlorite, and alum are discussed.

257. SCALE CONTROL. *Swimming Pool Data and Reference Annual,* 30:154, 1962.

A discussion of scale formation and control in swimming pools. The factors which influence scale formation are (1) the total alkalinity of the water, (2) the amount of calcium present, (3) the pH, (4) temperature, and (5) total dissolved solids. It is shown that scale can be controlled by proper regulation of these five factors.

Love, Alan

258. MAINTAINING WATER QUALITY. *Swimming Pool Age,* 32:7:48, July 1958.

A general discussion on how to maintain water quality by the proper operation of the swimming pool. Filtration by sand and diatomaceous earth filters, disinfection by chlorine and bromine, and algae control are a few of the items discussed.

Martin, F. E., Jr.

259. METHODS OF ELIMINATING EYE IRRITANTS. *Swimming Pool Age,* 32:5:35, May 1958.

Eye irritation in pools most commonly results from the washing out of the natural alkaline eye secretions and bringing the eye in contact with acid water or water containing chloramines, soaps, or other cleaning compounds introduced into the water. Acidity in water is controlled by proper addition of an alkaline compound. Chloramine concentration is lessened by elimination of ammonia or ammonium alum addition.

McIntyre, F. J.

260. ALKALINITY, pH, AND CHLORINATION. *Swimming Pool Data and Reference Annual,* 28:168, 1960.

A review of pH and alkalinity. The effect of pH and alkalinity on the reactions of chlorine when added to water is discussed. Suggests a safe treatment procedure to maintain the desired alkalinity in the pool. Recommends that alkalinity be kept in the range of 50-100 ppm with a pH of 7.2-7.8.

261. HOW TO CONTROL pH AND ALKALINITY. *Swimming Pool Age,* 39:7:14, July 1965.

Discusses the relationship between pH and alkalinity and their effect on swimming pool water. A procedure for determining the alkalinity of a water is outlined. The author emphasizes that swimming pool water should never have less than 50 ppm total alkalinity regardless of pH value.

Meslin, Jerry

262. THE pH ALKALINITY BASICS. *Swimming Pool Age,* 38:10:34, October 1964.

A comparison of pH and alkalinity showing their basic differences and also their common relationships.

263. pH, ALKALINITY, AND CARBON DIOXIDE. *Swimming Pool Age,* 38:1:146, January 1964.

Reviews the relationship between pH and alkalinity, and carbon dioxide and alkalinity which can influence the corrosiveness of water. If pH and alkalinity are high enough a thin deposit of calcium carbonate will form on the inside of metal surfaces. If the carbon dioxide content is low and alkalinity high, the carbonates will not change to bicarbontes causing the protective film to dissolve. Therefore, it is suggested that the pH be kept at the high end of the 7.2-7.6 range.

264. SWIMMING POOL DATA. *Swimming Pool Age,* 32:7:106, July 1958.

Describes the chemistry involved in using alum as a flocculant. Warns that where alum is used without regard for creating proper conditions for an ideal floc, the results are usually harmful. Gas chlorinators are discussed including the proper technique for connecting gas cylinders to the chlorinator. It is pointed out that most of the damage to chlorinating equipment occurs during the process of replacing empty containers. The purposes of the water and chlorine pressure gauges on a chlorinator, the vacuum gauge on a pump, and the differential pressure gauges on a filter are outlined. Gauges enable a pool operator to anticipate equipment problems before they become serious.

Reese, Robert M.

265. THE HOME POOL: SUMMER CARE AND MAINTENANCE. *Swimming Pool Age,* 31: 6:41, June 1957.

Outlines a treatment procedure for disinfection and algae control in a home swimming pool. Concentrations, amounts, and frequency of application of sodium hypochlorite and algicides are suggested.

Strand, Frank L.

266. SAFE, HEALTHY CITY, PUBLIC OPERATION DEPENDS ON GOOD DESIGN, FILTER KNOW-HOW. *Swimming Pool Age,* 40: 1:82, January 1966.

A general discussion of the principles of swimming pool filtration and disinfection. The importance of periodic evaluation of system efficiency is stressed. It is noted that because of the public health responsibility connected with operation of a swimming pool, it is essential that operating personnel are thoroughly trained in swimming pool mechanics and chemistry.

H. WATER TREATMENT—Filtration

Anonymous

267. POOL WATER CLARITY AND FILTER PERFORMANCE. *Swimming Pool Age,* 33:3: 44, March 1959.

The basic characteristics of diatomaceous earth filters are explained. Cylindrical element, leaf-type, and vacuum filters and their operation are described as well as the operating difficulties most commonly encountered. Filtration rates are discussed and a rate of 1½ to 3 g.p.m. is recommended as providing most economical operation. Chlorination and other chemical treatment methods are briefly reviewed.

Armburst, Henry M.

268. THE OPERATION AND APPLICATIONS OF VACUUM D.E. FILTRATION. *Swimming Pool Age,* 40:7:20, July 1966.

In this discussion of the operation of a vacuum diatomaceous earth filter, the author suggests that this type of filter be used particularly in heavily loaded or larger pools because vacuum filters can be of corrosion-proof construction, are easier and less costly to install, can be readily cleaned, and provide long filter runs.

Baker, William O.

269. DIATOMITE FILTER PROBLEMS: WHAT TO DO. *Swimming Pool Data and Reference Annual,* 28:104, 1960.

Some common diatomaceous earth filter problems and their solutions are reviewed. Among them are: flow rate too high; calcified element or septum; collapsed septum; and air in the filter.

270. SOLVING FILTER PROBLEMS. *Swimming Pool Data and Reference Annual,* 30:160, 1962.

Suggested solutions are given for the filter problems of short filter runs, gradually decreasing flow rates, and lack of clarity. The steps to take in replacing a filter system are discussed and performance differences in pressure and vacuum diatomaceous earth filters are compared.

Bentzinger, H. A.

271. THE BENEFITS OF CONSTANT BODY FEEDING OF DIATOMITE FILTERS. *Swimming Pool Age,* 34:5:68, May 1960.

The installation of a slurry feeder for addition of diatomaceous earth to a diatomaceous earth filter at a Boy's Club swimming pool has led to the following conclusions: (1) slurry feeding is justified by the savings obtained; (2) the amount of body feed is relatively low; (3) the agitator in the slurry tank should be just sufficient to maintain the diatomaceous earth in suspension because over agitation does not facilitate feedability.

272. INSTALLATION OF SLURRY FEEDER EQUIPMENT. *Swimming Pool Data and Reference Annual,* 28:100, 1960.

See item No. 271.

B-I-F Industries, Inc.

273. VACUUM-TYPE DIATOMITE FILTRATION. *Swimming Pool Data and Reference Annual,* 28:82, 1960.

A discussion of vacuum-type diatomaceous earth filtration including filter design and piping, accessory equipment, and operation and maintenance of the filter. The principal advantages of a vacuum-type diatomaceous earth filter are: it is smaller than the pressure-type diatomaceous earth filter and it requires less expensive and complicated piping and valving.

Costello, Milton

274. SAND AND GRAVEL VS. DIATOMACEOUS EARTH—A STUDY IN FILTRATION ENGINEERING. *Swimming Pool Age,* 40:5:39, May 1966.

This report reviews the features of diatomaceous earth and sand and gravel filter systems and compares the engineering economics of each type as applied to the system for the men's pool at the University of Illinois. The diatomaceous earth filter is found to be most advantageous with the most important factor being the clarity of pool water produced in the diatomaceous earth filter system was consistently superior to that produced by the sand filter system.

Ferguson, John K.

275. PERLITE: NEW FILTERAID. *Swimming Pool Age*, 36:12:17, December 1962.

Discusses the manufacture of perlite and use of perlite powders, which are similar to diatomaceous earth, as filter aids in water filters. Points out that in many applications perlite powders because they are 20 percent lighter than equivalent diatomaceous earth grades may result in cost saving of from 10 to 40 percent.

Foster, Cal

276. HOW TO FIND QUALITY IN SWIMMING POOL FILTERS. *Park Maintenance*, 18:3:38, March 1965.

Tips are given on what to look for in the design and construction of a diatomaceous earth filter that will guarantee a quality filter. The article deals with pressure filters but since there is little difference between pressure and vacuum, the same quality features should be looked for in either.

Harms, John

277. CARTRIDGE FILTERS – ARE THEY EFFECTIVE? *Swimming Pool Age*, 39:5:21, May 1965.

Outlines the principles of cartridge filtration pointing out that because the cartridge is disposable, complicated backwash plumbing and the problem of disposing of backwash water are eliminated. Notes that field and laboratory tests have proven that cartridge filtration is at least as efficient as other types of filtration.

Hubbard, Lloyd S.

278. A COMPARATIVE EVALUATION OF FILTER TYPES. *Swimming Pool Data and Reference Annual*, 32:49, 1965

The design and function of diatomaceous earth and sand filters are reviewed. The relationship between filtration, disinfection, and pH control is stressed showing how all three must be controlled to achieve swimming pool water of good quality.

279. A DISCUSSION OF SWIMMING POOL FILTRATION. *Parks and Recreation*, 47:6:260, June 1964

This three part discussion deals with (1) the purpose of swimming pool water filtration, (2) the design and function of sand filters, and (3) the design and function of diatomaceous earth filters. The more important aspects of the sand and diatomaceous earth filters are compared.

Jackson, T.M.; and Hutto, F. B.

280. DIATOMITE FILTRATION PROVES ITS WORTH IN TEST. *Swimming Pool Age*, 40:1:69, January 1966.

Reports a test program to compare two filter systems, a diatomaceous earth filter and a rapid sand filter, installed at the same pool. In general the authors' results indicated that the diatomaceous earth filter was superior to the rapid sand filter in the following respects: (1) ability to maintain pool clarity; (2) quality of filtered effluent; (3) power consumption (lower for DE); (4) water consumption (lower for DE); (5) cycle length; (6) over-all cost of operation.

Ludwig, Harvey F.

281. MAINTENANCE AND OPERATION OF PRESSURE SAND FILTERS. *Swimming Pool Data and Reference Annual*, 28:110, 1960.

Discusses what can be done to keep sand filters in good working condition. Points out that good operation of a plant depends primarily on two things: control of the chemicals so that good coagulation results, and conscientious and intelligent backwashing of the filters to maintain the filtration capacity and ability.

Martin, Frank E., Jr.

282. CALCIUM ION IN POOL WATER. *Swimming Age*, 32:11:84, November 1958.

Upon the fiber "cloth" used to support the diatomaceous earth cake in diatomaceous earth filters, there accumulates accretions of a hard, mineral-like substance, composed largely of calcium carbonate. There are several ways to rid the fabric of these unwanted deposits, but the best way to handle the situation is to prevent the deposits by the addition of sodium hexametaphosphate, which is available under the trade name "Calgon."

McDonald, Jim

283. PROPER OPERATIONAL PROCEDURES. *Swimming Pool Age*, 32:8:37, August 1958.

With the aid of diagrams the recirculation system of a swimming pool is explained. Briefly discusses other pool processes such as coagulation, algae control, chlorination, and pH control. Several suggestions are given for proper care of pool testing kits.

Meslin, Jerry

284. A CAPSULE SUMMARY OF POOL FILTRATION. *Swimming Pool Age*, 39:9:14, September 1965.

Briefly discusses sand, diatomaceous earth, and cartridge filters. Points out that: the sand filter is the most rugged of the three but also occupies the greatest space; the diatomaceous earth filter which is at least five times smaller than the sand filter, requires the greatest care and knowledge of operation; the cartridge filter is least complicated and is as small as the diatomaceous earth filter but requires the most time and work in cleaning the cartridges.

285. CLEAR , CLEAN WATER. *Swimming Pool Age*, 32:10:36, October 1958.

Although the life of the sand filter bed is supposed to be approximately 10 years, the following conditions can render it ineffective sooner: (1) channeling, caused by an underlevel filter or holes through the sand bed; (2) calcification of the sand due to high pH; (3) dirty and sticky sand or mudballs resulting from infrequent backwashing or inadequate backwash pressure; (4) insufficient depth of sand bed due to loss of sand. For these reasons, it is essential that there be an adequate inspection and maintenance program for filters.

Michael, J. M.

286 SOME FILTER PROBLEMS: HOW TO LOCATE TROUBLE. *Swimming Pool Age*, 34:4:124, April 1960.

Gives some problems and their solutions for pressure sand and diatomaceous earth filters including air binding and filter media difficulties in sand filters, and short filter runs and clogged filter elements in diatomaceous earth filters.

Murray, Ambrose J.

287. INTRICACIES OF CARTRIDGE SYSTEM ARE EXPLAINED. *Swimming Pool Data and Reference Annual*, 33:68, 1966.

The construction and operation of a cartridge filter is discussed along with a table that compares the cartridge filter with sand and diatomaceous earth filters.

Pallo, Peter E.

288. SAND AND ANTHRACITE. *Swimming Pool Age*, 35:2:48, February 1961.

Discusses filtration and backwash rates, media size and placement for filters employing sand or anthracite as filter media. Points out the necessity of using coagulants with these filters because of their inability to remove very fine suspended solids and colloidal suspensions.

Scott, Joe

289. HIGH RATE SAND FILTERS. *Swimming Pool Age*, 38:9:22, September 1964.

The general appearance, operation, performance, and initial purchase, operation, and replacement costs of a rapid sand filter, high rate sand filter, and diatomaceous earth filter are compared. It is concluded that the high rate sand filter is most acceptable, followed by the diatomaceous earth filter and rapid sand filter.

Shaw, Richard

290. DEVELOPMENT AND OPERATION OF THE HIGH RATE FILTER. *Swimming Pool Age*, 40:4:28, April 1966.

The high-rate sand filter is a pressure sand filter with permanent uniform media installation which is intended to operate at flow rates in excess of 12 gallons per minute per square foot. Advantages claimed for the filter include its ability to withstand very heavy duties and to operate with a minimum of maintenance and very little operator training.

Shields, R. E.

291. AN "X-RAY" OF VERTICAL DIATOMITE FILTERS. *Swimming Pool Age*, 39:5:56, May 1965

Discusses the principles of diatomaceous earth filtration plus the features of the filter including the filter tank and elements. The author gives two distinct advantages of a vertical diatomaceous earth pressure filter: since there are no flat surfaces for filter powder to pile up, the spent precoat and slurry earth flows freely to waste during backwashing; the filter occupies the very minimum of filter room floorspace.

Smith, George L.

292. RAPID FLOW, SINGLE MEDIA SAND FILTERS. *Swimming Pool Age*, 39:1:64, January 1965.

Explains how sand of the same grade and small holes in the underdrain system allow the rapid flow sand filter to be operated at a flow rate of 20 g.p.m. Among the advantages claimed for this filter are: small floorspace requirements; ease of operation; low backwash water requirements; requires no coagulation; and low maintenance costs.

Udwin, Ellis

293. A CONCISE COMPARISON OF FILTRATION METHODS. *Swimming Pool Data and Reference Annual*, 33:60, 1966.

Compares conventional sand, hi-rate sand, diatomaceous earth, and cartridge filters indicating the relationship between cost and efficiency of collection. The author feels that the hi-rate sand filter is superior to the other types because of simple operating requirements, media requires replacement only at very long intervals, and mechanical security is generally good.

Wingert, James L.

294. HOW CONSTANT AND VARIABLE FLOW RATES AFFECT FILTER CYCLES. *Swimming Pool Age*, 38:5:22, May 1964.

Studies show that for pressure-type diatomite filters the filter run decreases from 92 hours to 4 hours when the flow rate increases from 1 g.p.m. per square foot to 6 g.p.m. per square foot. Tests on vacuum diatomite filters by the National Sanitation Foundation reveal that good performance is observed if the flow rate is held between 1½ and 3½ g.p.m. per square foot of filter area. A low constant rate of flow to the filter can be obtained by sizing the filter and pump to handle pool turnover requirements under the head conditions of a dirty filter, and then using an automatic flow rate control valve to hold the flow rate at this point during the start and balance of the filter run until the filter is ready for backwash and precoat.

I. WATER TREATMENT—Disinfection

Andersen, John R.

295. THE EFFECT OF CYANURIC ACID ON CHLORINE'S KILLING POWER. *Swimming Pool Data and Reference Annual*, 32:86, 1965.

A study is reported which indicates generally that when cyanuric acid is added to the water of swimming pools, a higher chlorine content is needed to obtain the same bactericidal results as can be achieved under similar conditions when cyanuric acid is absent.

296. A STUDY OF THE INFLUENCE OF CYANURIC ACID ON THE BACTERICIDAL EFFECTIVENESS OF CHLORINE. *American Journal of Public Health*, 55:10:1629, October 1965.

See item No. 295.

Anonymous

297. HOW TO CALCULATE CHLORINE COSTS. *Swimming Pool Age*, 34:12:72, December 1960.

Explains how to figure probable cost for chlorine in any one of its three forms; gas, calcium hypochlorite powders, and sodium hypochlorite solutions. An example of each is given.

298. WHAT IT COSTS TO CHLORINATE. *Swimming Pool Data and Reference Annual*, 29:297, 1961.

See item No. 297.

299. WHY SULFAMIC ACID? *Swimming Pool Age*, 35:7:64, July 1961.

Reports numerous tests that were conducted on sulfamic acid. The tests' results showed that sulfamic acid: (1) stabilizes chlorine; (2) eliminates taste, smell. and eye irritation in chlorinated pools; (3) improves pool sanitation and algae control; (4) reduces fading of swimsuit fabrics and tinted hair; (5) reduces pH; (6) reduces scale formation.

Beatie, Russell H.

300. SULFAMIC ACID. *Swimming Pool Data and Reference Annual*, 30:126, 1962.

Discusses the use of sulfamic acid in swimming pools to stabilize or extend effective life of chlorine. It is noted that the use of sulfamic acid reduces the frequency of hypochlorite usage and the quantity of this material needed by up to 60 percent.

Black, A. P.

301. POOL DISINFECTION WITH IODINE. *Swimming Pool Age*, 36:4:14, April 1962.

This review of iodine research discusses the properties which appear to make iodine attractive as a disinfecting agent for swimming pool water. Among them are: (1) its effectiveness as a germicide over a wide range of pH values; (2) it does not combine with ammonia to form iodoamines; (3) odors and tastes are absent and irritation of the eyes of bathers does not appear to result from its use.

302. SWIMMING POOL DISINFECTION WITH IODINE. *Water and Sewage Works*, 108:7:461, July 1961.

See item No. 301.

Black, A P.; Kinman, R. N.; and Whittle, G. P.

303. A STUDY IN IODINE'S USE FOR POOL DISINFECTION. *Swimming Pool Age*, 40:1:74, January 1966.

A study of the use of iodine as a pool disinfectant in comparison to the use of chlorine for pool disinfection. It was concluded that: (1) iodine, released from potassium iodide by either chlorine gas or hypochlorite, has been shown to be an extremely effective disinfectant for swimming pool water; (2) the repeated reoxidation and reuse of the iodide ion by an inexpensive oxidizing agent makes it possible to disinfect a swimming pool at relatively low cost; (3) control of the iodide ion concentration eliminates the problem of color formation: (4) in heavily used pools, superchlorination should be applied about once in two weeks to prevent the build-up of organic matter and control algae; (5) a new, simple, rapid colorimetric test for the accurate determination of both free chlorine and iodine residuals has been developed.

Black, A. P.; Lackey, James B.; and Lackey, Elsie Wattie

304. EFFECTIVENESS OF IODINE FOR THE DISINFECTION OF SWIMMING POOL WATER.

American Journal of Public Health, 49: 1060, August 1959.

Eight swimming pools at Gainsville and Coral Gables, Fla., were used in a study to determine the efficiency of iodine. The following conclusions were reached: (1) residuals with iodine are more easily maintained than with chlorine in spite of higher bather loads; (2) byproducts with iodine are not formed such as chloramine with chlorine and ammonia which reduce effectiveness of disinfection; (3) no odors, tastes, or eye irritations were produced by the iodine dosages used; (4) no visible growth of algae were noted; (5) with uniform distribution of iodine in pool water no brown iodine color was observed.

305. EFFECTIVENESS OF IODINE FOR THE DISINFECTION OF SWIMMING POOL WATER. *Swimming Pool Age,* 34:1:44, January 1960.

See item No. 304.

Brown, John R.; McLean, Donald M.; and Nixon, Murray C.

306. BROMINE DISINFECTION OF A LARGE SWIMMING POOL. *Canadian Journal of Public Health,* 55:6:25, June 1964.

Bromine was used as a disinfectant at a large indoor overflow-refill public swimming pool over a period of 7 months. Relatively slight evidence of bacterial contamination with coliforms, enterocci, *Strepococcus viridans,* or *Staphylococci* was observed when the bromine residual was maintained above 2.0 p.p.m. No virus was isolated from 142 water samples.

307. BROMINE DISINFECTION OF SWIMMING POOLS. *Canadian Journal of Public Health,* 54:6:267, June 1963.

Bromination of swimming pool water using bromochloro-dimethyl-hydantion in which residuals of free and combined bromine were maintained above 4.0 p.p.m. achieved inactivation of coliform bacteria and enterococci were detected most infrequently. Relatively high bromine concentrations up to 9.0 p.p.m. caused no discomfort to bathers nor was there any appreciable odor.

Brown, Judson G.

308. A HIGHER CHLORINE SYSTEM IS URGED. *Swimming Pool Age,* 38:8:20, August 1964.

Cites reports that show a chlorine residual of 2.0 p.p.m. to 6.0 p.p.m., with a pH of 8.0 to 9.0, to be superior to the conventional chlorine residual of 0.4 p.p.m. at 7.6 pH. Among the advantages of the high chlorine system are lower chlorine consumption, algae are more easily killed and reduction of nitrogen trichloride, which causes eye irritation.

Byrd, Oliver E.; Malkin, Harold M.; Reed, George B.; and Wilson, Hal W.

309. SAFETY OF IODINE AS A DISINFECTANT IN SWIMMING POOLS. *Public Health Reports,* 78:5:393, May 1963.

The effects of swimming in pools in which iodine was used as a disinfectant were evaluated using three outdoor swimming pools at Stanford University. The authors concluded that iodine as a swimming pool disinfectant is safe, effective, and superior to chlorine in regard to eye discomfort and irritation.

Campbell, William; Faber, J. E.; Marshall, J. D., Jr.; and Wetzler, T. F.

310. IODINE — NEW DISINFECTANT FOR YOUR SWIMMING POOL. *Journal of Health — Physical Education — Recreation,* 35:5: 21, May-June 1961.

Discusses the properties and advantages of iodine and outlines the procedure for introducing potassium iodide into swimming pool water. It was pointed out that in addition to its bactericidal, viricidal, and cysticidal activity iodine does not irritate the eyes.

311. IODINE: SOME OF ITS ADVANTAGES AND LIMITATIONS. *Swimming Pool Age,* 35:8: 30, August 1961.

See item No. 310.

Cothran, Walter W.; and Hatlen, Jack B.

312. A STUDY OF AN OUTDOOR SWIMMING POOL USING IODINE FOR WATER DISINFECTION. *Student Medicine,* 10:4:493, April 1962.

Reports the techniques used and the results obtained in a study of a swimming pool in which iodine was used as the disinfectant. The iodine residuals maintained produced bacteriological samples within the limits of the *U.S. Public Health Service Drinking Water Standards.*

Ditzel, R. G.; Matzer, E. A.; and Symes, W. F.

313. NEW DATA ON THE CHLORINATED CYANURATES. *Swimming Pool Age,* 35:10:26, October 1961.

A laboratory study to determine if cyanuric acid reduces the efficiency of available chlorine in swimming pools. The following conclusions were reached: (1) under swimming pool conditions, the chlorinated cyanuric acids kill bacteria as effectively as sodium hypochlorite; (2) the addition of up to 100 p.p.m. cyanuric acid does not decrease the bactericidal efficiency of available chlorine; (3) if the presence of up to 100 p.p.m. cyanuric acid has any effect at all on the bactericidal effectiveness of available chlorine, it is an effect of increasing efficiency.

Favero, Martin S.; and Drake, Charles H.

314. COMPARATIVE STUDY OF MICROBIAL FLORA OF IODINATED AND CHLORINATED POOLS. *Public Health Reports,* 79:3:251, March 1964.

A comparative study of the predominant microbial flora of five swimming pools alternately iodinated and chlorinated. It is reported that iodine appeared to be more effective than chlorine against both the standard fecal indicators, the coliform bacteria and the entercocci, and against staphylcoccus.

Gilcreas, F. W.; and Morgan, George B.

315. CHLORINATED CYANURATE AND THE EFFECT OF CYANURIC ACID. *Swimming Pool Age,* 37:12:30, December 1963.

A study of the bactericidal capacity of a chlorinated cyanurate in comparison with NaOCl under identical conditions of pH value, time, and temperature of water is reported. Results indicated that a chlorinated cyanurate will provide adequate disinfection action of the water of a swimming pool, comparable to that given by NaOCl. The increasing concentration of cyanuric acid provided no interference when complete destruction of test organisms was required.

Goodenough, Robert D.

316. VARIABLES ON THE BACTERICIDAL ACTIVITY OF BROMINE IN WATER. *Swimming Pool Age,* 38:4:25, April 1964.

This report concludes that: there is a direct correlation between pH and the hydrolysis of bromine in water; there is a direct correlation between pH and the bactericidal activity of bromine; ammonia does not destroy the bactericidal activity of bromine; the loss of bromine from a swimming pool is directly related to the intensity of sunlight.

Griffin, Attmore E.

317. ALL SWIMMING POOLS NEED CHLORINATION. *Swimming Pool Age,* 31:5:46, May 1957.

A complete review of chlorination for disinfection of swimming pools. Shows the relationship between the disinfecting qualities of chlorine and the pool water chemistry, organic matter in the pool, sunlight, and filtration. Chemical solution pumps used to feed hypochlorites are briefly reviewed.

318. THE CHLORINATED CYANURICS. *Swimming Pool Data and Reference Annual,* 30:96, 1962.

This short review of the chlorinated cyanurics points out that they are a handy source of chlorine and the chlorine residuals produced are more stable than residuals produced by chlorine from other sources.

319. GENERAL OBSERVATIONS ON CHLORINATED CYANURICS. *Swimming Pool Age,* 36:3:63, March 1962.

See item No. 318.

320. HOW TO USE BREAKPOINT CHLORINATION. *Swimming Pool Data and Reference Annual,* 32:104, 1965.

Describes the methods and procedure to follow for using breakpoint chlorination in the disinfection of swimming pools. The success of breakpoint chlorination depends on two controlling factors namely: the amount of ammonia and organic nitrogen present and the pH of the water.

Griffin, A. E.; and Baker, R. J.

321. FREE RESIDUAL CHLORINATION. *Swimming Pool Data and Reference Annual,* 29:136, 1961.

A discussion of the breakpoint process of chlorination including the role of ammonia, reactions in breakpoint chlorination, points of chlorine application, chlorine requirements for benefits of free residual chlorination, and control of breakpoint chlorination.

Hays, Jim

322. COMPARATIVE USE: CHLORINE, BROMINE, IODINE, AND SILVER. *Swimming Pool Age,* 37:5:52, May 1963.

Reviews the use of chlorine, bromine, iodine, and silver as swimming pool disinfectants. The author feels that chlorination is the best method of disinfection. Compares the cost of chlorine gas, sodium hypochlorite, calcium hypochlorite, and cyanuric chlorine compounds showing that the latter is the most economical.

Hilton, Thomas B.

323. THE CHLORINATED CYANURATES. *Swimming Pool Age,* 35:11:20, November 1961.

Reports a test program conducted on nine St. Louis County swimming pools during the summer of 1960 to study the effects in swimming pool sanitation using potassium dichloroisocyanurate as the chlorine source. The results show that: cyanuric acid residual in pool water provides pronounced reduction in chlorine consumption which is proportional to the amount of cyanuric acid present; bather load and sunlight are two major factors in chlorine loss.

Hodge, Harold C.; Panner, Bernard J.; Downs, William L.; and Maynard, Elliott A.

324. TOXICITY OF SODIUM CYANURATE. *Toxicology and Pharmacology,* 7:5:667, September 1965.

A study to determine the safety of residues of cyanurate resulting from using chlorinated cyanuric acid or its salts in swimming pools. On the basis of the study, the use of low concentrations of chlorinated cyanuric acid in swimming pools is judged to be safe.

Johannesson, J. K.

325. THE BROMINATION OF POOL WATER. *Swimming Pool Data and Reference Annual*, 29:120, 1961.

This discussion on the use of bromine for swimming pool disinfection includes: the chemical behavior of free and combined bromine in pools; the breakpoint phenomena; the bactericidal action of bromine and bromamines; and analytical methods for determining the residual. Bromamines, in contrast to chloramines, have very strong bactericidal properties. This makes possible the use of a small combined bromine residual since there is no need to reach breakpoint in order to achieve strong disinfectant properties in the bathing water.

326. THE BROMINATION OF SWIMMING POOLS. *American Journal of Public Health*, 50:11:1731, November 1960.

See item No. 325.

Kabler, Paul W.; and Chambers, Cecil W.

327. GERMICIDES FOR SWIMMING POOLS. *Soap and Chemical Specialties*, 38:9:79, September 1962.

A general review of germicides used for disinfection of swimming pools. Neutralizers for use in germicide tests are briefly discussed. Emphasis is placed on the pathogenic bacteria that are of primary concern in swimming pools.

Kabler, Paul W.; Clarke, Norman A.; Berg, Gerald; and Chang, Shih L.

328. VIRICIDAL EFFICIENCY OF DISINFECTANTS IN WATER. *Public Health Reports*, 76:7:565, July 1961.

Data from studies of the efficiency of various disinfectants in inactivating enteric viruses in water appear to support the following: (1) different types of enteric viruses vary widely in degree of resistance to free chlorine; (2) combined chlorine is considerably less viricidal than free chlorine; (3) iodine is an effective viricide, but requires greater residuals and longer contact than hypochlorous acid; (4) chlorine dioxide, ozone, and ultraviolet may be useful disinfectants; but their efficiency in water compared to free chlorine and the effects of pH and temperature have not been established.

Kay, L. A.

329. THE CONSTRUCTION AND OPERATION OF OPEN AIR SWIMMING POOLS AND BATHING PLACES. *Canadian Journal of Public Health*, 51:10:411, October 1960.

Provides guidelines for maintaining the sanitary quality of the following: (1) the natural bathing place; (2) the standard swimming pool; (3) the modified swimming pool (an artificial reservoir in the ground); (4) the artificial lake (created by damming a creek); (5) the modified artificial lake (chlorination is used); (6) the wading pool. Bacterial standards are suggested for natural bathing places, modified swimming pools, and the artificial and modified artificial lakes.

Koski, T. A.; Stuart, L. S.; and Ortenzio, L. F.

330. COMPARISON OF CHLORINE, BROMINE, AND IODINE AS DISINFECTANTS FOR SWIMMING POOL WATER. *Applied Microbiology*, 14:2:276, March 1966.

The germicidal activity of chlorine, bromine, and iodine were tested to determine their effectiveness as swimming pool water disinfectants. In the various systems tested, gaseous chlorine was the most active form of available chlorine; liquid bromine provided the most active form of bromine, and metallic iodine provided the most active form of iodine. Results showed that 0.3 p.p.m. available chlorine as chlorine gas had activity equivalent to 0.6 p.p.m. of available chlorine in the buffered sodium hypochlorite control when E coli was used as the test organism. With S. faecalis as the test organism, 0.45 p.p.m. available chlorine as gaseous chlorine gave activity equivalent to the control. Liquid bromine at 1.0 p.p.m. was as effective as the 0.6 p.p.m. of available calcium hypochlorite control with E. coli as the test organism, but 2.0 p.p.m. of liquid bromine was necessary to provide activity equivalent to the 0.6 p.p.m. of available chlorine control when S. faecalis was employed. With iodine as metallic iodine, 2.0 p.p.m. was necessary to provide a result equivalent to the 0.6 p.p.m. of available chlorine with both E. coli and S. faecalis.

Kowalski, Xavier; and Hilton, Thomas B.

331. CHLORINATED CYANURATES AS USED TO DISINFECT SWIM POOL WATER. *Swimming Pool Age*, 40:1:44, January 1966.

Data from controlled swimming pool tests in 1960 and from 138 pools operated in a routine manner during the 1963 season showed that pools treated with chlorinated cyanurates had a better disinfection record than pools treated with other common chlorine sources.

332. COMPARISON OF CHLORINATED CYANURATES WITH OTHER CHLORINE DISINFECTANTS. *Public Health Reports*, 81:3:282, March 1966.

See item No. 331.

Laubusch, Edmund J.

333. CHLORINE IDEAL POOL WATER DISINFECTANT? *Swimming Pool Age*, 32:10:26, October 1958.

The chlorination of water in swimming pools is discussed as the method of choice in providing a safeguard against health hazards to the bathers. A continuous method of chlorination is recommended to have effect prior to filtration (prechlorination). Accident hazard due to escape of chlorine gas is pointed out. Pertinent regulations under State laws are reviewed and their variability noted. The leadership given to State regulatory agencies by the American Public Health Association Joint Committee on Swimming Pools and Bathing Places is inferred and the need for uniformity of regulations is stressed.

334. DISINFECTION OF PUBLIC SWIMMING POOLS. *Public Works*, 89:6:85, June 1958.

See item No. 333.

Marshall, J. D.; Faber, J. E.; and Campbell, B. S.

335. ADVANTAGES AND LIMITATIONS OF IODINE DISINFECTION OF AN INDOOR SWIMMING POOL. *American Journal of Public Health*, 52:7:1179, July 1962.

Low-level and high-level iodine disinfection of the water of a large indoor (University of Maryland) swimming pool was studied, using a controlled swimming group. Under normal operating conditions, the group preferred iodine-disinfected water over chlorine-disinfected water. There was a marked diminuation of the incidence and severity of eye irritation and a decline in skin irritation and ear infection when iodine disinfection was employed.

Marshall, J. D., Jr.; McLaughlin, J. D.; and Carscallen, E. W.

336. IODINE DISINFECTION OF A COOPERATIVE POOL. *The Sanitarian*, 22:199, January-February 1960.

This study to determine the practicability of iodine as a disinfectant in a large community pool concluded that: iodine was at least as effective as chlorine for disinfection of pools in the volume studied; iodine did not form complexes with nitrogenous compounds which were irritating to the eye and mucosa of the nose of bathers; no difficulties were encountered in the operation of the pool with maintenance of free iodine in the range of 0.2-0.6 p.p.m.

Marshall, John D.; Wolford, Claire B.; and Faber, John E.

337. CHARACTERIZATION OF A. FAECALIS ISOLATED FROM AN IODINE-DISINFECTED SWIMMING POOL. *Public Health Reports*, 76:6:529, June 1961.

Supplies data on the basic physiological characteristics of an organism identified as *Alcaligenes faecalis*, together with information on its resistance to various levels of iodine and chlorine disinfection. It was found that the organism comprised approximately 99 percent of the total bacteria count of swimming pool water and it was highly resistant to halogen disinfectants. The authors conclude that apparently the organism has no great significance in the sanitary analysis of swimming pool water.

McCarthy, Joseph A.

338. SULFAMIC ACID AS A VEHICLE FOR CHLORINE. *Swimming Pool Data and Reference Annual*, 29:80, 1961.

This report concludes that: a given amount of chlorine, properly mixed with sulfamic acid will give greater kills of bacteria than the same amount of chlorine alone or a chloramine; subject to further study, it seems preferable to add the chemicals in sequence rather than after mixing; loss of active chlorine due to sunlight, wind and splashing, and casual organic matter are definitely reduced.

McLean, Donald M.; Brown, John R.; and Nixon, Murray C.

339. MICROBIOLOGICAL HAZARDS OF FRESH-WATER BATHING. *Health Laboratory Science*, 1:3:151, July 1964.

Experiments are described demonstrating that there is a rapid dispersal of attenuated poliovirus-2 in water both in swimming pools and in lake water under winter conditions. Bromine was investigated as a substitute for chlorine as a biocidal agent and was found to be effective in concentration greater than 2.0 p.p.m.

340. RECIRCULATING AND "OVERFLOW-REFILL" PUBLIC SWIMMING POOLS: A CHEMICAL AND MICROBIOLOGICAL APPRAISAL. *Canadian Journal of Public Health*, 53:1:9, January 1962.

Studies on the chemical constituents of two outdoor public swimming pools during 1961 showed levels of nitrogenous material and chlorine which increased more rapidly and to higher concentrations in a completely recirculating pool than in an overflow-refill pool, but following conversion of the recirculating pool to overflow-refill operation, the levels of solutes in both pools were approximately the same. A residual of 0.3 to 0.5 p.p.m. free chlorine or free bromide was found to be sufficient to inactivite three types of polio virus and six other types of enterovirus in buffered saline of pH 7.0 and 22° C. after 10 minutes contact time.

Morgan, George B.; Gilcreas, F. Wellington; and Gubbins, Pauline P.

341. CYANURIC ACID — AN EVALUATION. *Swimming Pool Age*, 40:5:31, May 1966.

Among the conclusions reached in this evaluation of cyanuric acid were: (1) cyanuric acid and chlorinated cyanurates provide a stable chlorine residual for swimming pools; (2) tests conducted employing both synthetic systems and swimming pool water show little effect of 100 mg/l of cyanuric acid on the killing power of free chlorine residual of 0.6 or 1.0 mg/l derived from hypochlorites or chlorinated cyanurates.

Ortenzio, L. F.; and Stuart, L. S.

342. Pool Disinfectant Test Procedures Outlined. *Swimming Pool Age,* 39:6: 22, June 1965.

A biological test, using Escherichia coli and Streptococcus faecalis as test organisms, has been designed to determine the germicidal activity of water containing 0.4-1.0 p.p.m. of available chlorine at pH 7.0-7.5. The procedure can be readily adapted to study the effects of chlorine stabilizers, the influence of various algicides applied as adjuncts to water disinfectants on germicidal activity, and determination as to the acceptability of residual disinfecting activity of swimming pool waters during time that the pool is in use.

343. Pool Disinfectant Test Procedures Outlined. *Swimming Pool Data and Reference Annual,* 33:32, 1966.

See item No. 342.

Putnam, E. V.

344. Iodine vs. Chlorine, Treatment of Swimming Pools. *Parks and Recreation,* 44:4:162, April 1961.

Reports the results of the use of potassium iodide in one pool and chlorine in three other pools in Yakima, Wash. Lists the advantages and disadvantages for both chlorine and iodine treatment. The two distinct advantages of iodine over chlorine are no disagreeable odor and mucous membranes are not irritated.

Quinn, Wallace

345. Pool Water Problems: Their Solution. *Swimming Pool Data and Reference Annual,* 31:108, 1964.

A review of chlorination and related practices. Discusses the disinfection and algae control properties of chlorine along with its effect on pH. The chemical treatment practice for recirculating pools is detailed. Chlorine gas dispensers and chemical solution feeders are reviewed. A list of precautions to follow when using chlorine for disinfection is given.

Robinton, E. D.; Wood, E. W.; and Elliot, L. R.

346. The Study of Bacterial Flora in Swimming Pool Water Treated With High-Free Residual Chlorine. *American Journal of Public Health,* 47:9:1101, September 1957.

Studies were conducted on four swimming pools. It was concluded that: Levels of high free residuals are easy to maintain regardlesss of the swimming load. High free residual chlorination of swimming pool water provides a water which has minimal bacterial density. Less emphasis need be placed on bacterial standards for swimming pool water having a high free chlorine residual if accurate titrations of the chlorine residues are carried out routinely.

Shay, E. G.; Clarke, P. H.; and Crawford, R.

347. Quaternaries as Swimming Pool Disinfectants. *Soap and Chemical Specialties,* 41:5:126, May 1965.

Exploratory work on the use of quaternary ammonium compounds as the sole disinfectant for swimming pool water has shown that certain quaternary ammonium compounds will achieve 30-second kill of *E. coli* and *S. faecalis.* The difference in bactericidal effectiveness of various quaternaries at a 7.0-p.p.m. concentration is demonstrated with the use of described test procedures.

Stein, A. L.

348. Study of 270 Public, 236 Semipublic, and 298 Residential Pools in Texas. *Swimming Pool Age,* 33:5:115, May 1959.

This study of swimming pools gives data on the following subjects for each class of pool: filter system or fill-and-draw type; type of filter used; type of disinfectant used; and type of paint or other pool finish used. Pressure sand filters and chlorinated rubber-base paints were used in a majority of the pools. Chlorine gas was the most frequently used disinfectant in public and semipublic pools while hypochlorites were most popular in residential pools. Over half of the residential pools were the fill-and-draw type.

Stuart, L. S.; and Ortenzio, L. F.

349. Swimming Pool Chlorine Stabilizers. *Soap and Chemical Specialties.* 40:8:79, 1964.

This report on isocyanuric acid, sulfamic acid, and urea concludes that although they are effective in curbing rapid chlorine loss from outdoor pools, stabilizers may raise problems by slowing down bactericidal activity. The minimum chlorine residual for acceptable germicidal action can be expected to vary with different nitrogen compounds and the amounts used.

Svirbely, J. L.

350. New Sources of Available Chlorine. *Swimming Pool Age,* 34:3:39, March 1960.

A comprehensive toxological study involving chlorinated isocyanurates. The author concludes that "no public health hazard should arise in the use of chloroisocyanuric compounds or combinations of cyanuric acid and hypochlorite for swimming pool sanitation under ordinary use conditions, provided the cyanurate concentration does not exceed 100 p.p.m."

Thompson, John

351. THE CHLORINATED CYANURICS: AFTER A YEAR OF USE. *Swimming Pool Age*, 35:6: 24, June 1961.

Reviews the characteristics of chlorinated cyanurics and discusses a procedure to condition the pool with cyanuric residue of 25-30 p.p.m. to prevent ultraviolet light from taking chlorine from the water. The author points out that such factors as safety, ease of use, storage stability, reduced handling, total solubility, and neutral pH make chlorinated cyanurics a desirable chlorine source.

Zettler, Toby T.; and Selsor, J. Quinn

352. WHICH CHLORINE SANITIZER SHOULD YOU USE? *Swimming Pool Age*, 40:7:22, July 1966.

A review of the chemistry, stability in pool water, the bactericidal effectiveness, and shelf life of the following chlorine-base sanitizers used in swimming pool water treatment: (1) elemental (gas) chlorine; (2) hypochlorites; (3) N-chloro organic compounds which include chlorinated isocyanurates; (4) N-chloro inorganic compounds formed from separate additions of a disinfectant and stabilizer to pool water.

J. WATER TREATMENT—Algae Control

Blair, Frank

353. A REVIEW OF ALGAE CONTROL CHEMICALS. *Swimming Pool Age*, 33:11, 105, November 1959.

Discusses chlorine, quaternary ammonium compounds, and copper sulfate as pool algicides. Concludes that algae problems are best approached by conducting a detailed survey of the pool, including the pool data and analysis of the causitive agent, and then determining the particular algae control method to be used.

Fitzgerald, George P.

354. BACTERICIDAL AND ALGICIDAL PROPERTIES OF SOME ALGICIDES FOR SWIMMING POOLS. *Applied Microbiology*, 7:205, July 1959.

Bactericidal properties of recommended initial and weekly concentrations of six commercial algicides were tested against sewage bacteria. Results were compared with those obtained with 0.1 mg. per liter free available chlorine and 5.0 mg. per liter copper. The chemicals were ranked on this basis. Algicidal properties of these six chemicals and copper were then determined against three species of algae. Again, on this basis, the six products were ranked.

355. BIOASSAY FOR ALGICIDAL CHEMICALS IN SWIMMING POOLS. *Water and Sewage Works*, 109:9:361, September 1962.

A procedure for a bioassay to study the effectiveness of algicidal chemicals in swimming pools is presented and discussed. The procedure has been used to compare the duration of effective algal inhibitory properties of two commercial algicides on a type of green algae.

356. FACTORS IN THE TESTING AND APPLICATION OF ALGICIDES. *Applied Microbiology*, 12:3:247, May 1964.

A review is presented of some of the factors affecting the laboratory testing and practical applications of chemicals toxic to algae. The basic factor demonstrated is that the amount of chemical required to inhibit the growth of algae is dependent on the amount of algae present and not on the volume of water in which the algae are dispersed. It is shown how a chemical can be tested for algistatic or alcicidal properties, thus enabling one to decide how to best apply a particular chemical.

357. FIELD TESTS ON THE DURATION OF ALGICIDES IN SWIMMING POOLS. *The Sanitarian's Journal of Environmental Health*, 25:5:319, March-April 1963.

A study indicating rapid loss of quaternary ammonium and amine compound-type algicides from swimming pool water by adsorption on filter media with suggestions regarding treatment frequency and points of application to maintain effective concentrations.

358. LOSS OF ALGICIDAL CHEMICALS IN SWIMMING POOLS. *Applied Microbiology*, 8:5: 269, September 1960.

Tests were designed to demonstrate the adsorption of four quaternary ammonium compounds, two amines, and a pyrimidine on a diatomaceous filter aid. The loss in toxicity of treated solution of these chemicals varied from 50 percent to more than 67 percent. Suggests that algicides be added to swimming pools at frequent intervals to make up for these losses.

359. WHAT TO DO FOR MORE LASTING AND EFFECTIVE CONTROL OF ALGAE. *Swimming Pool Data and Reference Annual*, 28:122, 1960.

Discusses types of algae and control of algae with algicides. The importance of applying the algicide in sufficient quantity and often enough to maintain its effective strength is noted.

Frances, Saul

360. HOW GOOD IS YOUR PRESENT ALGICIDE? *Swimming Pool Age,* 36:11:25, November 1962.

Discusses the use of chlorine, copper sulfate, quaternaries, and mercury salts for algae control. Gives six requirements that algicides should meet to be considered safe and effective.

Hays, Jerry

361. TYPES OF ALGAE AND THEIR CONTROL. *Swimming Pool Data and Reference Annual,* 30:167, 1962.

A short review of free-floating and wall-clinging types of algae, and methods of algae control. Chemical treatment, proper pH, pool cleanliness, and adequate filtration are four most important ways of algae control.

Lackey, J. B.; Lackey, E. W.; and Morgan, G. B.

362. IODINE AS AN ALGAECIDE FOR SWIMMING POOLS. *Engineering Progress at the University of Florida,* 18:3:1, March 1964.

Experiments were carried out on 136 species of algae apt to be present in swimming pools, using free iodine, iodine plus potassium iodide, and free chlorine as well as combinations, to see if the amount necessary for control could be determined. Factors affecting the kill and the killing mechanism are discussed. It was concluded that a free iodine residual of 0.2 p.p.m. after the demand was met, or an equivalent by the action of chlorine, if maintained would provide excellent control for bacteria, algae, and protozoa.

Michael, Jerrold M.

363. ALGAE CONTROL. *Swimming Pool Age.* 33:5:54, May 1959.

Among the objectional features that algae may create are: high chlorine demand; increased water turbidity; slippery pool bottoms, sides, walkways, and ladders. Methods of control include routine chlorination, application of copper sulfate and quaternary ammonium compounds, and superchlorination.

Stern, Robert M.

364. THE BASIC PROPERTIES OF ALGAE, HOW THEY DETERMINE CHEMICAL TREATMENT. *Swimming Pool Data and Reference Annual,* 32:78, 1965.

The algae which are most often found in pools are usually classified into two groups: the free-floating and the wall-clinging types. The three factors which influence the effectiveness of any algicide are: the concentration of the algicide, the age of the algae, and the number of algae present. It is pointed out that neither copper sulfate nor the quaternary ammonium halide compounds are very effective algicides.

K. POOL MANAGEMENT AND TRAINING

Anonymous

365. POOL OPERATORS FORM UNION. *Swimming Pool Age,* 38:9:21, September 1964.

The Florida Beach and Pool Employees Union was formed to upgrade the working conditions of pool operators and personnel. Some of the points covered in a sample union contract are listed and the four job classifications of pool personnel are outlined.

Bauer, George H.

366. TOWN DETAILS HOW IT BUILT, OPERATES POOL. *Swimming Pool Data and Reference Annual,* 32:37, 1965.

The superintendent of recreation for Milburn Township, N.J., discusses the following points in relation to building and operating Millburn's swimming pool: preliminary study, site selection, pool design, costs and financing, operation, opening and closing steps, and membership program.

Cron, George T.

367. INCOME, EXPENSES, BUDGETING. *Swimming Pool Data and Reference Annual,* 29:44, 1961.

A guide on how to finance and staff community pools, anticipate revenues, train and hire personnel, and prepare a workable budget. It is stressed that the success of pool operations depends upon competent well-trained personnel.

Dickens, Jimmie D.

368. TEXAS' 1964 "SHORT SCHOOL" RECORD. *Swimming Pool Data and Reference Annual,* 32:139, 1965.

Outlines the program organization, instruction, certification, and success of Texas' "short school" for swimming pool operators.

Fishel, Charles V.

369. A STUDY OF LIFEGUARD TRAINING AND BEHAVIOR. *Swimming Pool Age,* 37:5:42, May 1963.

A Kansas study of lifeguard alertness revealed that the average lifeguard on an "average" day in an "average" pool looked away from his area of responsibility 40 percent of his guarding time. To increase lifeguard performance, a training program was developed, 65 hours in length, and divided into two parts consisting of lifeguarding and first aid.

Griffin, Attmore E.

370. DICTIONARY OF POOL TERMS. *Swimming Pool Data and Reference Annual*, 33:27, 1966.

A glossary of 72 commonly used swimming pool terms.

Heeb, L. J.

371. MUNICIPAL POOL OPERATORS SALARIES. *Swimming Pool Data and Reference Annual*, 31:202, 1964.

A table of pool operators salaries based on a survey of pools in 90 cities and 4 counties (109 pools) in the State of Kansas (1962-63). The highest salary "paid by the month" was $480 and the lowest was $100 with the average being $291.

Hoyt, William L., Jr.

372. SWIMMING POOL "LIABILITY-INSURANCE-TAXES." *Swimming Pool Age*, 32:11:140, November 1958.

The following requisites are suggested to help eliminate loss and subsequent liability for swimming pool accidents: (1) knowledge of and compliance with the laws relating to fences around swimming pools; (2) adequate safe storage of chemicals; (3) adequate supervision and observation while pool is in use; (4) proper care or regular servicing by competent, authorized personnel; (5) proper maintenance and safe operation of mechanical equipment; (6) the establishment and maintenance of an every day routine which will afford maximum safety and enjoyment from the use of the pool. Liability insurance and pool taxes are discussed.

Keeton, Grover C.

373. POOL OPERATING COST STUDY. *Swimming Pool Data and Reference Annual*, 30:32, 1962.

This study on swimming pool operating and maintenance expenditures is based on one typical pool operated by the city of Dallas Park and Recreation Department in 1961. Includes a chart showing the breakdown of expenditures.

374. POOL PERSONNEL, PROGRAMMING, OPERATOR TRAINING, MANAGEMENT. *Swimming Pool Age*, 37:4:42, April 1963.

Discusses the importance of having competent swimming pool personnel and gives some suggestions for personnel classification. Cites specific procedures used in the Dallas municipal swimming pool program that provides continuous training for pool personnel.

Laubusch, Edmund J.

375. EMPLOYEE TRAINING: EMERGENCY HANDLING. *Swimming Pool Data and Reference Annual*, 30:177, 1962.

Points out that safety in handling chlorine depends, to a great extent upon the effectiveness of employee education, proper safety instruction, intelligent supervision, and the use of safe equipment. Suggestions for establishing and maintaining an effective safety program are given.

Lindeburg, Franklin A.

376. HOW COMPETENT ARE YOUR LIFEGUARDS. *Swimming Pool Age*, 36:9:22, September 1962.

Describes a competitive examination for lifeguards which was developed to obtain an indication of the ability of each applicant compared to the other applicants; to obtain judgments as to character and personality; and to discover abilities to teach. The four separate parts of the test each with specific points to be checked plus a personality and character rating are: rescue of a violent victim; demonstration of swimming ability; ability to teach a skill; performance of specific skills. Copies of the four test sheets are shown in the article.

Meslin, Jerry

377. POOL OPERATION: "THE NEW PROFESSION." *Swimming Pool Age*, 32:11:62, November 1958.

On September 9, 1958, compulsory certification of operators of public pools was passed into law in Dade County, Fla. Operators are required to pass an examination made up by the State board of health to prove they possess the minimum knowledge to do their job satisfactorily. The certification ordinance is included in the article.

378. TEACHER OFFERS TIPS ON GIVING A POOL OPERATOR'S COURSE. *Swimming Pool Age*, 39:3:68, March 1965.

Outlines the training course given for swimming pool operators in Greater Miami giving tips on lectures, teaching aids, and tests. Includes some sample test questions of the true-false, completion, matching, and multiple-choice type.

Michael, Jerrold M.

379. HOW POOL OPERATORS CAN BE TRAINED. *Swimming Pool Age*, 34:10:20, October 1960.

Discussion of the increasing need for swimming pool operators instruction courses including the scope of this training, training tools available, and administration of training programs.

380. TRAINING OF SWIMMING POOL OPERATORS. *The Sanitarian*, 23:3:157, November-December 1960.

See item No. 379.

Morris, Matt and Mari

381. SCHOOL AND COMMUNITY SHARE TWIN POOL PROJECT. *Swimming Pool Age,* 32: 11:50, November 1958.

The two new joint-venture swim centers in Hayward, Calif., have proved a successful solution. The recreation district financed the construction costs on land which was provided by the school district. Pool features, financing plan, annual upkeep, and maintenance, and personnel are discussed.

National Swimming Pool Institute

382. A GLOSSERY OF POOL TERMS. *Swimming Pool Data and Reference Annual,* 28:206, 1960.

Definitions of 81 commonly used pool terms.

383. A GLOSSERY OF SWIMMING POOL TERMS. *Swimming Pool Age,* 33:11:186, November 1959.

See item No. 382.

Nock, Samuel

384. HOW TO CALCULATE POOL OPERATING COSTS. *Swimming Pool Data and Reference Annual,* 31:46, 1964.

Outlines a simple method of determining pool operating costs in advance on pools of several sizes and gives conversion tables that may be utilized to reflect different unit costs for power, water, fuel, climate, and labor costs.

Pezoldt, C. W.

385. WHAT DOES IT COST TO OPERATE? *Swimming Pool Age,* 33:2:22, February 1959.

A survey of financial administration of 34 outdoor swimming pools in 26 Illinois park districts. The data describes financial budgets and population served, revenue sources, and a study of current operating expenses.

Sorge, Robert E.

386. SWIM COACH SUGGESTS MINIMUM REQUIREMENTS. *Swimming Pool Age,* 40:7: 31, July 1966.

Suggested minimum requirements are offered for admittance into a lifeguard training course. It is emphasized that stringent requirements are major factors in insuring the preparation of the lifeguard for effective and satisfying participation in the training course.

Stair, Linn

387. TRAINING AND CERTIFICATION OF LIFEGUARDS. *Swimming Pool Age,* 34:5:78, May 1960.

Outlines the American Red Cross senior life saving course which gives potential lifeguards fundamental training for their varied duties. Offers suggestions for extra training for lifeguards to help improve job performance.

Stern, James F.

388. THE LEGAL RESPONSIBILITY OF CITIES, STATES FOR POOL ACCIDENTS. *Swimming Pool Age,* 40:4:38, April 1966.

With the aid of court cases, this article strives to determine whether, for liability purposes a municipal corporation, in establishing, maintaining, and operating a bathing beach or swimming pool, is exercising governmental (immune) or proprietary (nonimmune) functions. The author concludes that there is an increasing tendency for courts to hold the municipal corporation to the same standards of legal liability as private utilities.

389. WHAT RESPONSIBILITIES DO POOL OPERATORS HAVE? *Swimming Pool Data and Reference Annual,* 33:104, 1966.

Discusses some of the important legal aspects of pool management and operation using guidelines that are generally acceptable throughout the country. Points out that since all states are not in agreement on these legal aspects, it is essential that the State law be examined carefully, especially with respect to municipally owned pools which are subject to a somewhat different set of rules than private or club pools.

Theobald, William F.

390. COUNTY ATTACKS STAFF TURNOVER RATE. *Swimming Pool Age,* 39:1:40, January 1965.

The Municipal Aquatic Association of Nassau County, N.Y. conducted a survey of county pools using a questionnaire covering four areas: beach/pool data; scope of operation; staff administrative and supervisory; and miscellaneous operation. A copy of the questionnaire is shown. The results are given in tabulated form showing pool personnel salaries and other data for the following types of pools: public; semipublic; private; semiprivate; residential; camp; and transient.

Thomas, David G.

391. NEW YORK COUNTY'S TRIAL OPERATOR'S CLINIC PROVES A SUCCESS. *Swimming Pool Age,* 39:7:22, July 1965.

A 5-hour swimming pool operator's clinic was organized in the Binghamton-Broom County, N.Y., area. Lectures and films covered such topics as: legal aspects of pool ownership and operation; pool filtration and chemistry; and personal safety in and around the pool.

U.S. Department of Health, Education, and Welfare

392. KENTUCKY EXPERIMENT PROVES HUGE

SUCCESS. *Swimming Pool Data and Reference Annual,* 33:132, 1966.

A report on the "Operation Waterproof, Fourth Grade" project that took place in Hardin County, Ky. The project was designed to teach water safety to fourth graders through courses provided in the school, during the regular school year, and as a part of the regular school curriculum, utilizing portable pools which could be moved from school to school.

Ward, Elwyn

393. THE POOL ADMINISTRATOR'S JOB. *Swimming Pool Age,* 33:9:21, September 1959.

The pool administrator should protect his employees from damage suits, keep them out of court, and protect them from criticism and bad publicity. To enable this, the administrator should see that: adequate insurance is in force to not only protect the city but also the user; rules governing the conduct of swimmers are written and made public; there is a report made on all accidents.

Woolever, Charles W.

394. SOME LEGAL ASPECTS OF POOL CONSTRUCTION. *Swimming Pool Data and Reference Annual,* 28:160, 1960.

Discussion of legal aspects of pool location, construction, operation, maintenance, and use. Owners are advised to carry public liability insurance to cover the risks of water escape and bodily injury.

L. REGULATIONS

American Public Health Association

395. *Suggested Ordinance and Regulations Covering Public Swimming Pools.* New York: American Public Health Association, 1964. 36 pages.

Comprehensive minimum standards for the design, operation, and maintenance of public swimming pools prepared by the Joint Committee on Swimming Pools and Bathing Places in cooperation with the U.S. Public Health Service.

Anonymous

396. ARTICLE 680, NATIONAL ELECTRICAL CODE, 1965. *Swimming Pool Age,* 39:12:25, December 1965.

Presents provisions of the National Electric Code that apply to construction and installation of electric wiring for equipment in or adjacent to swimming pools, to metallic appurtenances in or within 5 feet of the pool, and to the auxiliary equipment such as pumps, filters, and similar equipment.

397. COMPETITION POOL STANDARDS. *Swimming Pool Data and Reference Annual,* 28:150, 1960.

Lists standards that have been established for competition pools by the American Athletic Union of the United States, the National Collegiate Athletic Association, and the National Council of the YMCA.

398. COURT DECISIONS AFFECTING MUNICIPAL SWIMMING POOLS. *Swimming Pool Age.* 31:8:68, August 1957.

Various court decisions resulting from accidents occurring in municipally owned swimming pools are cited. The decisions vary not only with the circumstances surrounding the accidents, but also with the attitude of the court as to the nature of the function performed.

399. GUIDELINES FOR MUNICIPAL CONTROL OF FAMILY SWIMMING POOLS. *Public Works,* 92:10:176, October 1961.

General guidelines are given for developing a residential pool ordinance. Outlines subjects that may be included in the code such as enactment, administration, enforcement, and inspections. Points out the need for careful consideration of basic criteria including zoning, water supply, plumbing, safety, and construction materials.

400. LOS ANGELES ISSUES GUIDE TO CHLORINATED CYANURATES. *Swimming Pool Age,* 40:5:38, May 1966.

A proposed policy statement on chlorinated cyanurates is given along with minimum chlorine concentrations which are acceptable as equivalent to the chlorine residuals required by the California State swimming pool regulations. A cyanuric acid level of over 100 p.p.m. is not recommended.

401. A PRACTICAL, DIAGRAMMATIC INTERPRETATION OF NEC ARTICLE 680: "POOL ELECTRICAL GROUNDING SYSTEM." *Swimming Pool Age,* 37:7:28, July 1963.

Presents a drawing to aid in clarifying the provisions of the code. Comments on the diagram are given by Philip Sperber, Chairman of the NSPI Lights Standards Committee.

402. ROOFTOP POOLS SOLVE ZONING RESTRICTIONS. *Swimming Pool Data and Reference Annual,* 32:63, 1965.

Zoning laws in New York that require outdoor swimming pools to be at least 100 feet from the property line has been circumvented by building pools on rooftops. The rooftop pool enables the owner to use rooftop space which is otherwise waste space.

Balchen, E. H.

403. Modified Swimming Pools in Manitoba. *Canadian Journal of Public Health,* 53:6:260, June 1962.

A modified swimming pool in Manitoba, Canada, is one constructed of relatively impermeable naturally occurring material. A modified standard pool is generally constructed of concrete with skimmers substituted for scum gutters and the recirculated water is not fully conditioned. The article outlines the standards and operation requirements governing these types of swimming pools.

Beardon, Francis W.

404. What Kind of Swimming Area Controls Govern Your State? *Swimming Pool Age,* 31:11:56, November 1957.

Presents a brief analysis and evaluation of the status of the swimming area controls in the United States. Recommendations are given for the improvement and establishment of swimming area controls. The author emphasizes the need for controls that provide intelligent consideration of the problems encountered in the construction and operation of public swimming areas.

Bliss, A. Harry; and Steimetz, William H.

405. Health Service Responsibilities for College and University Swimming Pool Operation. *The Sanitarian,* 21:41, July-August 1958.

At the University of California, swimming pools and bathing places utilized by staff and student population on the campus and adjacent areas are under the surveillance of the Division of Sanitation in the Office of the University Physician. The rise in popularity of fraternity and sorority pools has led to the formulation of a swimming pool code by the Dean of Students at the Los Angeles campus of the University of California.

Committee of Design and Function of the Commission for the Development of Swimming Pool Construction Standards, California State Board Education.

406. Swimming Pool Design in Relation to Function, Part I and Part II. *Swimming Pool Age,* 35:3:22, March 1961; 35:4:55, April 1961.

A complete set of recommended standards for the pool structure, the recirculation system, dressing rooms, spectator areas, lighting, ventilation, heating, safety, space requirement, and bather loading. Contains more detailed recommendations than the American Public Health Association's "Suggested Ordinance and Regulations Covering Public Swimming Pools" on heating and ventilation, spectator area, dressing rooms, and lighting.

Cross, Alex

407. The Supervision of Swimming Pools. *Canadian Journal of Public Health,* 48:244, June 1957.

The author discusses swimming pool inspection in Canada. The need for constant education in swimming pool maintenance and sanitation is stressed as an effective way to reduce pool problems. A routine manner of inspecting swimming pool facilities is described. Construction and operation of swimming pools in Canada is patterned on the APHA publication "Recommended Practice for Design Equipment, and Operation of Swimming Pools and Other Public Bathing Places."

Curlett, S. L.

408. The Future Swimming Code. *Swimming Pool Age,* 31:2:42, February 1957.

In this analysis of the need for established minimum swimming pool standards and fair and equitable regulations, the author outlines some of the difficulties and problems of the situation and indicates a course of action.

Gable, Tom S.

409. The What and Why of NSF. *Swimming Pool Data and Reference Annual,* 32:98, 1965.

Describes the organization of the National Sanitation Foundation and discusses the reasoning behind the entry of the National Sanitation Foundation into testing of pool products. In 1960 the NSF Committee for Swimming Pool Equipment Standards was established. On adoption of a standard, test procedures are developed to determine the compliance of equipment with the requirements of the standard. Manufacturers may request evaluation of their equipment. If the equipment meets the requirements of the standard, a seal of approval is issued.

Karch, Kenneth M.

410. Application of a Data Processing System to a Swimming Pool Inspection Program. *Public Health Reports,* 80:3:211, March 1965.

A data handling and processing system, developed by engineers of the Du Page County, Ill., Health Department, was used to tabulate and report results of the county's swimming pool inspection program in 1963. The system allows the department to better evaluate the operation of public swimming pools. With the simple tabulation of data, problems at a given pool can quickly and easily be pinpointed.

Laak, R.

411. The Bather Loading-Limit Factor for Public Swimming Pool Design. *Canadian Journal of Public Health,* 55:9:392, September 1964.

Reviews bather loading limits of Canada, 11 American states, West Germany, Canadian Department of National Health and Welfare, American Public Health Association - U.S. Public Health Service, and the National Swimming Pool Institute. Concludes that since overcrowding cannot be measured or determined scientifically, opinions and educated guesses have formed the basis for calculations. Thus the area approach, being used on opinions, promoted wide variations in application.

Michael, J. M.

412. SWIMMING POOLS AND HEALTH. *Swimming Pool Age*, 33:9:42, September 1959.

Outlines the role of the health department which includes: cooperation with local governing bodies toward the adoption of a sound swimming pool construction and operation ordinance, provide consultation to swimming pool contractors, architects, and engineers concerned; review plans and specifications for new and remodeled pools; provide inspectional services; and develop an educational program. Plan and specification review is discussed at length and a checklist is given as a suggested aid for reviewing swimming pool plans.

Mood, Eric W.

413. SHOULD PUBLIC HEALTH AGENCIES "CONTROL" PRIVATE SWIMMING POOLS? *Swimming Pool Age*, 34:3:59, March 1960.

The results of a survey of members of the Conference of Municipal Public Health Engineers show that the control of public swimming pools is a part of the program of most local health agencies, but that control of private swimming pools has not yet been included in most programs of sanitation of municipalities.

National Swimming Pool Institute

414. NSPI'S RECOMMENDED STANDARDS FOR PUBLIC AND SEMIPUBLIC POOLS. *Swimming Pool Age*, 32:8:24, August 1958.

The first industrywide minimum standards for public and semipublic pools developed by the NSPI appear. They were drafted by a special National Standards Committee for Public Pools headed by Pascal P. Paddock of Pascal P. Paddock, Inc., as chairman, and composed of architects, engineers, manufacturers, and builders of public pools, all with a great many years of specialized experience.

415. NSPI'S RECOMMENDED STANDARDS FOR RESIDENTIAL SWIMMING POOLS. *Swimming Pool Age*, 32:7:26, July 1958.

The proposed standards were prepared by the NSPI Standards and Ethics Committee through its special Subcommittee on Standards for Residential Pools. The proposal is not a model code, but rather recommended minimum standard.

416. NSPI STANDARDS FOR PUBLIC POOLS. *Parks and Recreation*, 41:10:416, October 1958.

See item No. 414

417. RESIDENTIAL SWIMMING POOL, I, II, AND III. *Architectural Record*, 124:7:205, July 1958.

See item No. 415.

Ogg, John W.

418. THE INDOOR POOL: PRINCIPLES OF DESIGN AND CONSTRUCTION. *Swimming Pool Data and Reference Annual*, 28:24, 1960.

Outlines requirements of design and construction for YMCA indoor pools including materials, mechanical equipment, sanitary control, and safety. Some suggestions for proper operation of the pool are listed.

Smith, Arthur L.

419. A CHECKLIST OF SCHOOL POOL REGULATIONS. *Swimming Pool Age*, 33:9:54, September 1959.

Gives suggested regulations for a school swimming pool with regard to: qualification of instructors; safety regulations; safety equipment; cleanliness; class size; clothing; maintenance of the pool; use by outside groups.

Stern, James F.

420. STATE COURTS UPHOLD HOME POOL ORDINANCES. *Swimming Pool Age*, 40:5:42, May 1966.

Cases are cited in which the courts have considered the validity, construction, and effect of statutes, ordinances, or regulations specifically relating to private residential swimming pools. The author notes that courts have uniformly upheld the constitutional validity of ordinances relating to residential pools on the theory that such ordinances were necessary for the protection of public health, safety, or welfare.

U.S. Department of Health, Education, and Welfare

421. RECOMMENDATIONS FOR SWIMMING POOLS AND OUTDOOR BATHING PLACES. *Park Maintenance*, 19:3:40, March 1966.

Gives general principles of bathing place sanitation which applies to all classes of public bathing places. Recommends some design requirements and suggests bacterial quality criteria for swimming pools. Wading pools and outdoor bathing places are briefly discussed with bacteriological standards given for outdoor bathing places.

II. NATURAL BATHING PLACES

Anonymous

422. THE ANSWER TO BEACH POLLUTION. *The American City,* 78:4:84, April 1963.

The Milwaukee Health Department is endeavoring to control pollution of the city's Lake Michigan beaches. Describes dye tests conducted to learn how pollution moves from the mouth of the Milwaukee River through harbor breakwaters to beaches north and south of the harbor. Results of the tests are given.

423. CHLORINATION OF SWIMMING AREA IN METROPOLITAN PARK. *Parks and Recreation,* 44:11:457, November 1961.

Wallace Lake in Cleveland was constructed from old sandstone quarried by the WPA and a beach was graded for bathing and swimming. With the suction line of a moderate size pump at one end of the beach, and a perforated discharge line running the length of the beach, overchlorinated water is distributed in the swimming area.

424. MIAMI BEACH AND SHOWER PROBLEMS. *Parks and Recreation,* 44:11:456, November 1961.

Beach showers were installed at two beaches by the Miami Park and Recreation Department. A heavy gage stainless steel column with five stainless steel shower heads was installed on a circular concrete slab. The cold water valves are self-closing to minimize water. Complete specifications for the shower installation are given.

425. TYPHOID TRACED TO BATHING AT A POLLUTED BEACH. *Public Works,* 92:5:182, May 1961.

Of the 15 cases which comprised an outbreak of typhoid fever in western Australia, 10 were associated with a nearby bathing beach. The sewage treatment plant outfall 1 mile from the beach, was discharging improperly treated sewage which was carried to the bathing area by prevailing winds and currents.

426. WILMETTE BEACH ADDS MODERN TOUCH TO BATHHOUSE. *Park Maintenance,* 18:3:44, March 1965.

A progressive park board at Wilmette, Ill., made a simple change to improve clothing checking procedures at their beach facility. By changing from basket checking service to a coin operated locker checking system, Wilmette Beach handles more people at less cost, with far greater convenience for all concerned.

Brown, John R.; McLean, Donald M.; and Nixon, Murray C.

427. SWIMMING POOLS AND BATHING PLACES IN SOUTHERN ONTARIO: CHEMICAL AND MICROBIOLOGICAL STUDIES DURING 1962. *Canadian Journal of Public Health,* 54:3:121, March 1963.

Chemical and microbiological investigations were carried out at 42 public bathing areas along Lake Ontario, Lake Erie, Lake Huron, and small lakes during the summer of 1962. Coliform indices exceeded 1,000/100 ml. at 52 percent of the beaches, but only 12 percent of the beaches had coliform indices less than 50/100 ml. No virus was isolated from any water sample.

Conover, H. S.

428. BEACH CONSTRUCTION IN A STATE PARK. *Parks and Recreation,* 1:5:420, May 1966.

Construction details are given for a bathing beach in Robert Moses State Park near Massena, N.Y. Construction included clearing the area, grading the beach, and filling the area with sand. Details of the building complex are outlined including the bathhouse, administration building, and food concessions.

Diesch, Stanley L.; and McCulloch, William F.

429. ISOLATION OF PATHOGENIC LEPTOSPIRES FROM WATERS USED FOR RECREATION. *Public Health Reports,* 81:4:299, April 1966.

Recreational use of water can be a hazard to man's health, as in the 1959 and 1964 outbreaks of leptospirosis in one Iowa area. The infected persons had swum in water to which cattle, swine, and wild animals had direct access or water into which pasture land drained.

Dillenberg, H. O.; and Dehnel, M. K.

430. TOXIC WATERBLOOM IN SASKATCHEWAN, 1959. *Canadian Medical Association Journal,* 83:1151, November 26, 1960.

Blooming and scum-forming blue-green algae in the summer of 1959 killed numerous dogs, cattle, and also poultry which watered at the shore of lakes in Saskatchewan where scum had massed. Cases of human involvement tend to indicate a hazard exists for humans bathing at such sites.

Gorham, Paul R.

431. TOXIC ALGAE AS A PUBLIC HEALTH HAZARD. *Journal, American Water Works Association,* 56:11:1481, November, 1964.

This article indicates that different species of marine and fresh water algae, belonging to different classes, are toxic to animals and, in some cases, to man. Algal toxins, as far as they are known, are chemically different. The fish and livestock poisons produced by red tides and water blooms seem to be nuisances and economic hazards rather than public health hazards.

Hill, Rolland

432. IS SAFETY SITTING IN THIS SEAT? *Swimming Pool Age,* 40:7:18, July 1966.

Preventive lifeguarding is discussed in which the most important aspect related to potential in-the-water emergencies is the lifeguard's ability to foresee or anticipate trouble. Suggestions are given for adequately lifeguarding a large surf-beach area. Rescue equipment that should be a necessity at any beach or pool is reviewed.

Hunter, George W.; Molloy, James F.; and Ullman, A. F.

433. MORE SEABATHERS ERUPTION. *American Journal of Public Health,* 53:9:1413, September 1963.

Presents a report of the investigation of an extensive outbreak of skin eruptions among swimmers in the Gulf of Mexico, in the vicinity of Bay, Gulf, and Franklin Counties in Florida. Although no definite causative agent could be demonstrated to explain the outbreak, there was considerable evidence to indicate that this was not "swimmer's itch," but more likely an outbreak of the type referred to in the literature as "seabathers eruption."

Hutton, Robert F.

434. MARINE DERMATOSIS. *Archives of Dermatology,* 82:6:951, December 1960.

Reviews various reports of "seabathers eruption" in which the causative agent is not known. Reports an outbreak of "sea sting" reported by approximately 20 bathers in shallow inshore waters of the Gulf of Mexico at Readington Beach, Fla. The stings resulted from minute, needlelike organisms which penetrated the bathers' suits.

Limmer, Otto; and Limmer, John

435. AN ARTIFICIAL LAKE: RECIRCULATED; CHLORINATED! *Swimming Pool Age,* 31:11:96, November 1957.

After hand-chlorination failed in this spring-fed, artificial lake, a chlorination and recirculation system was installed. The intake line of the system was located near the mouth of the natural spring. Water drawn in here passes through a hair trap and pump, is chlorinated, adjusted to proper alkalinity and returned to the lake through outlets in the distribution line which is laid beneath the lake bottom in a horseshoe shape.

Mullett, Howard

436. A POOL MONEYSAVER: GROUP WASHING. *Park Maintenance,* 15:3:66, March 1963.

The advantages of using column showers with five heads are discussed showing how these units can reduce construction and maintenance costs. The development of a beach shower in Florida using a modified stainless steel column shower is outlined giving construction details for the shower.

Nicholls, C. P. L.

437. DANGER ON THE BEACH. *Parks and Recreation,* 41:6:258, June 1958.

Outlines some natural hazards of waterfront recreation and suggests some measures to protect bathers from these hazards. The safety program utilized at large southern California beaches is outlined. Also included is a list of ten requisites for a good lifeguard.

Public Health Activities Committee of the Sanitary Engineering Division

438. COLIFORM STANDARDS FOR RECREATIONAL WATER. *Journal of the Sanitary Engineering Division, American Society of Civil Engineers,* 89:SA4:57, August 1963.

The Committee reports that there is little, if any, conclusive proof that disease hazards are directly associated with large number of coliform organisms. Comprehensive research is recommended to provide data for establishing sanitary standards for recreational waters on a more rational public health basis. British investigations show that even finding typhoid organisms and other pathogens in recreational waters is not indicative of these diseases in the population producing the sewage. The Committee recommends that beaches not be closed and other decisive action not to be taken if current microbiological standards are not met unless evidence of fresh sewage or epidemiological data would support such action.

Sherman, L. K.

439. CONNECTICUT STUDIES ITS SHORE BATHING WATERS. *Connecticut Health Bulletin,* 75:5:139, May 1961.

During the summers of 1959 and 1960, four sea water samples were collected, at different stages of the tide, from each of a series of sampling points along the Connecticut coast. The results were classified according to the proportion of sampling stations that had MPN coliform counts falling in four arbitrary classes; A, 0-5 per 100 ml.; B, 51-100; C, 501-1,000; and D, over 1,000. The findings are tabulated.

Walker, H. H.; Shinn, M. F.; Higaki, M.; and Ogata, J.

440. SOME CHARACTERISTICS OF "SWIMMING POOL" DISEASE IN HAWAII. *Hawaii Medical Journal,* 21:5:403, May-June 1962.

Eight cases of chronic granulomatous skin disease in Hawaii due to infection by *Mycobacterium balnei* are described. Two cases acquired the infection after receiving abrasions while in salt water, so the organism might have been present in salt water. Only one case gave a history suggestive of swimming pools as the source of infection.

Young, Clarence L.

441. RECREATIONAL USE OF DOMESTIC WATER SUPPLY RESERVOIRS. *California's Health,* 19:23:169, June 1, 1962.

Recommends that in the future more adequate facilities be provided, better programs of patrolling be established, and stronger public health programs of surveillance of these reservoir areas be continuously carried on. Recreational activities should always be subordinate to the production and delivery of safe water to water consumers.

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AUTHOR INDEX[1]

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