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AN EVALUATION OF POLICY FOR PUBLIC SPAS  
AND HOT TUBS IN BRITISH COLUMBIA  
by

Robert A. Crandall  
B.A. Stanford University 1972

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Department of COMMUNITY & REGIONAL PLANNING

The University of British Columbia  
1956 Main Mall  
Vancouver, Canada  
V6T 1Y3

Date April 12, 1983

## ABSTRACT

Increasing numbers of deaths, injuries, and disease outbreaks associated with the use of spas and hot tubs have created increasing concern about the effectiveness of existing spa management policies and procedures. The problem of devising appropriate public spa policies is complicated by the high degree of uncertainty related to spa management. In examining this problem, the thesis evaluates policy for public spas and hot tubs and proposes a set of policies for the Province of British Columbia which would provide reasonable public health and safety protection.

The potential hazards associated with spa use are examined in order to identify the risks and uncertainties which pose difficulties for spa management. The difficulties illuminate several basic issues which policy evaluation must address. A framework is developed for evaluating spa management policies based upon public policy and public health literature. Using criteria established by the evaluative framework, spa policies and practices in selected jurisdictions of the United States and Canada are evaluated. Literature and interviews obtained from government agencies, the industry, spa operators and others are used as a basis of information for the evaluation. A set of spa policies for British Columbia is then proposed which is designed to meet the evaluative criteria and overcome existing deficiencies evidenced by the U.S.-Canadian experience.

The results of the study indicate that potential hazards

associated with public spas and hot tubs justify government regulation of spa management in a manner different from regulation of swimming pool and other public bathing activities. Spa policies in British Columbia which provide reasonable public health protection should be developed to accomplish the following; (1) precisely define spa hazards, (2) provide an acceptable level of "safe" conditions for spa users and the public, (3) actively involve spa users and operators in policy development, (4) provide policy implementation measures which effectively deal with the variable conditions of spas, and (5) organize a social learning process to reduce uncertainties and improve spa management practices. Specific recommendations for attaining these objectives are suggested.



## TABLE OF CONTENTS

|                                                                                                                                                          |     |
|----------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| Abstract .....                                                                                                                                           | ii  |
| List Of Figures And Tables .....                                                                                                                         | vi  |
| Acknowledgements .....                                                                                                                                   | vii |
| I. INTRODUCTION .....                                                                                                                                    | ix  |
| II. CHAPTER 1                                                                                                                                            |     |
| <u>The Development Of The Spa And Hot Tub Market And Its</u><br><u>Implications For The Establishment Of Policy</u> .....                                | 1   |
| What Are Spas And Hot Tubs? .....                                                                                                                        | 1   |
| The Emergence Of Spas And Hot Tubs As A Public Concern .                                                                                                 | 2   |
| The Development Of The Spa And Hot Tub Market And Its<br>Economic And Social Impacts .....                                                               | 3   |
| An Explanation For The Rapid Growth Of The Spa And Hot<br>Tub Market .....                                                                               | 8   |
| Implications Of The Spa And Hot Tub Market Development<br>For The Establishment Of Policy .....                                                          | 11  |
| Summary .....                                                                                                                                            | 12  |
| III. CHAPTER 2                                                                                                                                           |     |
| <u>The Characteristics Of Risks And Uncertainties In</u><br><u>Regulation Of Public Health Hazards Associated With Spas</u><br><u>And Hot Tubs</u> ..... | 16  |
| Definitions Of "Risks" And "Uncertainties" .....                                                                                                         | 16  |
| Spas And Hot Tubs: Public Health Concerns .....                                                                                                          | 18  |
| Potential Hazard Areas .....                                                                                                                             | 22  |
| Pathogenic Hazards .....                                                                                                                                 | 22  |
| Managing Spa Water Quality To Control Pathogens ..                                                                                                       | 22  |
| Controlling Specific Pathogens .....                                                                                                                     | 30  |
| Hyperthermia Hazards .....                                                                                                                               | 37  |
| Visual Hazards From Poor Water Clarity .....                                                                                                             | 40  |
| Drowning Hazards Related To The Spa Aeration Systems                                                                                                     | 41  |
| Identification Of Specific Risks And Uncertainties<br>Within The Potential Hazard Areas .....                                                            | 43  |
| Major Policy Difficulties Arising From Spa Management<br>Uncertainties .....                                                                             | 50  |
| F. Basic Issues Involved In The Regulation Of Spas .....                                                                                                 | 59  |
| IV. CHAPTER 3                                                                                                                                            |     |
| <u>How Should Public Spa And Hot Tub Policy Be Designed?</u> ..                                                                                          | 65  |
| Governmental Responsibility For Protecting Users Of Spa<br>Facilities .....                                                                              | 65  |
| Governmental Responsibility For Protecting The Public<br>From External Effects Of Spa Operations .....                                                   | 68  |
| Decision Processes For Determining Spa Regulation And<br>Provision Of Information To The Public .....                                                    | 70  |
| Development Of Effective Implementation Measures .....                                                                                                   | 72  |
| Establishment Of A Social Learning Process To Reduce<br>Uncertainty .....                                                                                | 75  |
| Criteria For Evaluating Alternative Spa Policies .....                                                                                                   | 78  |
| V. CHAPTER 4                                                                                                                                             |     |
| <u>Experience In The U.S. and Canada</u> .....                                                                                                           | 85  |
| A. Background Of The U.S. Experience .....                                                                                                               | 85  |
| Scope Of Study .....                                                                                                                                     | 85  |
| A Brief Description Of The U.S. Experience .....                                                                                                         | 88  |

|                                                                                                 |     |
|-------------------------------------------------------------------------------------------------|-----|
| B. The U.S. Structure Of Organizational Involvement<br>With Public Spas .....                   | 93  |
| C. The Actors And Their Relation To The System .....                                            | 94  |
| Analysis Of The U.S. Experience .....                                                           | 96  |
| Governmental Roles And Responsibilities .....                                                   | 96  |
| Decision-Making Processes For Establishing Conditions<br>Of "Safe" Use .....                    | 103 |
| Implementation Practices .....                                                                  | 107 |
| Provision For Social Learning .....                                                             | 112 |
| Deficiencies In U.S. Spa Policies And Practices: Lessons<br>For Design Of Model Policy .....    | 114 |
| The Canadian Experience With Spas .....                                                         | 115 |
| Scope Of Study .....                                                                            | 115 |
| Description Of The B.C. Public Health System<br>And Its Relation To Public Spas .....           | 116 |
| The British Columbia Experience With Spas .....                                                 | 118 |
| The Case For Spa Policy Change In British Columbia ..                                           | 120 |
| VI CHAPTER 5                                                                                    |     |
| <u>Recommendations For A Spa Policy Framework For British<br/>Columbia</u> .....                | 124 |
| Development Of Approved Standards And Procedures For<br>Public Spas And Hot Tubs .....          | 125 |
| Determination Of Provincial Public Spa/Hot Tub Standards<br>And Management Policies .....       | 127 |
| Measures For Implementing Spa Standards And Management<br>Policies In B.C. ....                 | 129 |
| Policies To Reduce Uncertainties And Improve Spa<br>Management And Enforcement Procedures ..... | 134 |
| E. Notes On Provisions For Funding .....                                                        | 137 |
| Summary And Expected Results: How The Model Policy Can<br>Correct Present Deficiencies .....    | 139 |
| APPENDIX A                                                                                      |     |
| Pathogenic Hazards And Public Spa/Hot Tub Facilities ....                                       | 146 |
| APPENDIX B                                                                                      |     |
| Current Knowledge & Guidelines For Spa Management .....                                         | 167 |
| APPENDIX C                                                                                      |     |
| Behavioural Considerations Of Spa Actors .....                                                  | 174 |
| APPENDIX D                                                                                      |     |
| A Detailed Description Of The U.S. Experience .....                                             | 190 |
| APPENDIX E                                                                                      |     |
| The B.C. Health Act And Its Provisions For Spas .....                                           | 224 |
| APPENDIX F                                                                                      |     |
| A Sample Spa Operator Training Program .....                                                    | 235 |
| APPENDIX G                                                                                      |     |
| A Sample 'Plan Of Operation' .....                                                              | 241 |

LIST OF FIGURES AND TABLES

| <u>FIGURE</u> |                                                 | <u>PAGE</u> |
|---------------|-------------------------------------------------|-------------|
| 1             | Pool Sales vs Spa/Hot Tub Sales 1976-1980 ..... | 7           |

| <u>TABLE</u> |                                                                                             | <u>PAGE</u> |
|--------------|---------------------------------------------------------------------------------------------|-------------|
| I            | CPSC Cases Involving Spa Fatalities<br>January 1, 1979 - June 14, 1981 .....                | 19          |
| II           | The U.S. Structure of Organizational Involvement<br>With Public Spas and Hot Tubs .....     | 93          |
| III          | The Canadian Structure of Organizational<br>Involvement With Public Spas and Hot Tubs ..... | 115         |
| IV           | Current Knowledge and Guidelines for Spa<br>Management .....                                | 170         |

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## INTRODUCTION

The purpose of this thesis is twofold: (1) to develop a framework for evaluating policies governing the operation and use of public spas and hot tubs; (2) to apply this framework to recommend a set of policies for British Columbia which will assure reasonable protection of public health and safety in public spa and hot tub use. To achieve these objectives, the problems and uncertainties faced in spa management will be identified and these will be related to a number of normative considerations to establish a framework for evaluating public policy. To provide a practical insight into the status and limitations of current policies, existing policies in selected parts of the United States and Canada will be described and evaluated. Using the evaluative framework and analysis of existing policies as a guide, a set of policies for regulating public spa and hot tubs in British Columbia will be recommended.

The reason for this study is the increasing concern about the occurrence of deaths, injuries, and disease outbreaks associated with spa\* use and the possibility that present policy in British Columbia may be inadequate for protecting public health and safety. The protection of public health and safety

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\*Note: Spas and hot tubs are virtually identical in function and purpose. The only significant difference is that "hot tubs" refer to units where the material construction of the shell is wooden. This difference has some possible ramifications for spa management. The reader should be aware of the distinction, but for the sake of brevity, the word "spas" will frequently be used to mean both spas and hot tubs.

in the related activity of swimming in public facilities has traditionally been a regulatory concern of government. Further, it has also been suggested, by some experts, that public spas pose a greater health and safety risk than public swimming pools. In view of these considerations, an examination of the potential hazards associated with public spas, and the costs and benefits of alternative policies to protect public health and safety would appear to be needed.

Current public spa policy in the U.S. and Canada is inconsistent and in some areas, confused. Standards, regulations, and guidelines, where they do exist, vary greatly within each country. In some jurisdictions, policy is non-existent and in other jurisdictions, the existing policies are questionable when considered in light of spa management problems and uncertainties. In view of the evident confusion and limitations of existing policies, this thesis endeavors to determine how existing policies should be designed. The thesis is organized as follows:

1. The first chapter describes the historical development of public spas in order to provide the reader with a background on spas and the growing importance of the spa industry.
2. The second chapter will identify the nature of the public health risks and uncertainties associated with spa management in order to determine the basic issues involved in the regulation of spas.
3. By drawing upon the literature dealing with the design of

public policies and the protection of public health, the third chapter develops a framework for evaluating public policies governing spa management.

4. The fourth chapter describes and evaluates existing spa management policies in selected parts of the United States and Canada, based upon the framework developed in chapter three.
5. The final chapter utilizes the evaluative framework developed in chapter three and draws upon the U.S. and Canadian experience described in chapter four to specify a proposed set of spa management policies for British Columbia which will assure a reasonable protection of public health and safety.



## CHAPTER 1

### The Development of the Spa and Hot Tub Market and Its Implications for the Establishment of Policy

#### What are Spas and Hot Tubs?

Spas and hot tubs conjure up many different images. Individual perceptions range from ideas of arthritic therapy to sexual stimulation. Some people call them "Jacuzzis" (a brand name misnomer which has captured substantial generic status); some call them "whirlpools" (primarily derived from the swirling action of the water); others refer to them as "cesspools" (a term reflecting negative biases toward spas as a result of questioning their cleanliness and water quality); and some people tag them "baby pools" (a term illustrating a subtle, but significant factor for much misuse and misunderstanding of spas and hot tubs). In any case, it is true that there are many varieties, sizes, shapes, and uses for spas and hot tubs, providing a basis for their diverse descriptions and their perceived attributes.

An excellent formal and general definition of spas and hot tubs is provided in the U.S. Health and Human Services publication, "Suggested Health and Safety Guidelines for Public Spas and Hot Tubs".<sup>1</sup>

Spas and hot tubs are pools designed for recreational and therapeutic use and for physiological and psychological relaxation. These pools are not drained, cleaned and

refilled after each use and may include, but are not limited to these types: hydrojet circulation, hot water, cold water, mineral baths, air induction systems or some combination of these.

Spas and hot tubs are shallow in depth and not meant for swimming or diving.

However, these facilities, like swimming pools, are closed cycle water systems and may be designed with complete water circulation, filtration, heating and in some cases disinfectant and overflow systems integrated with the water circulation system. In most cases, both spas and hot tubs equipped with heaters have automatic water temperature controls.

A public spa and hot tub, depending on its size, location and support equipment capacity, can accommodate from one to many bathers.

### The Emergence of Spas and Hot Tubs as a Public Concern

In the mid 1970's a phenomenon known as "hot tubbing" took hold on the West Coast, reinforcing the image of California as "the land of nuts and fruits bent on moral destruction through its hedonistic and libertine pursuits". While this phenomenon was regrettable to some and welcome to others, spas and hot tubs did not suffer the short-lived fate of many fads, but instead they became established as a viable and growing industry throughout North America. Although the first early model spas for consumer purchase date back to 1970 and a number of spas in public facilities were in operation even earlier, no real market existed until 1973,<sup>2</sup> and it is generally recognized that 1977 was the turning point when spas began to have a major impact upon our social milieu.<sup>3</sup>

The emergence of the spa and hot tub market has produced significant economic and societal impacts despite its relatively small distribution thus far. Along with these impacts, the

nature of the product and its use also gave rise to public health and safety concerns in a number of ways. The subject of spas and hot tubs is not only an example of traditional problems faced in dealing with public health hazards in water planning and management, but it is also illustrative of the growing importance of dealing with uncertainty in public policy development. Greater complexity and rapid change in our society increasingly and abruptly exposes us to public health hazards often well before our scientific and institutional knowledge is sufficient to manage the situation properly. In choosing spas and hot tubs as an example, this case study aims at developing a strategy and design which is relevant to this general problem.

#### The Development of the Spa and Hot Tub Market and Its Economic and Social Impacts

Despite our modern view of spas and hot tubs, we are reminded that their cultural use and acceptance has long precedence. As one spa chemical manufacturer's maintenance manual aptly describes the historical role:

Congratulations on becoming part of history. As the owner of a spa/hot tub, you are now part of a social phenomenon that is traceable back to ancient Egypt, to the prehistoric cities of the Indus Valley, to the early civilizations around the Aegean Sea and the Orient as well.

The ancient Greeks devised luxurious bathing provisions with heated water, plunges, and showers. The Romans developed bathing as a public diversion to a unique and elaborate degree. The Japanese traditionally use the bath as a disciplined, spiritual ritual. The cleansing comes first and the bath is restrained, simple, and suitable for quiet contemplation. It's up to you to use your spa/hot tub in any way or in many ways for your benefit and pleasure. You have a beautiful addition to your way of

life and we want to help you keep it that way.<sup>4</sup>

Today, spas and hot tubs are found just about everywhere, in private residential use and public or commercial facilities.

Spas and hot tubs are here to stay, and to some people their presence means a myriad of new public health problems. According to Cranford K. Gibbs, an engineer with the Ontario Ministry of Health: "The whirlpool spa/hot tub problem is with us now, and is affecting the lives of hundreds of people . . . adversely, in my view."<sup>5</sup>

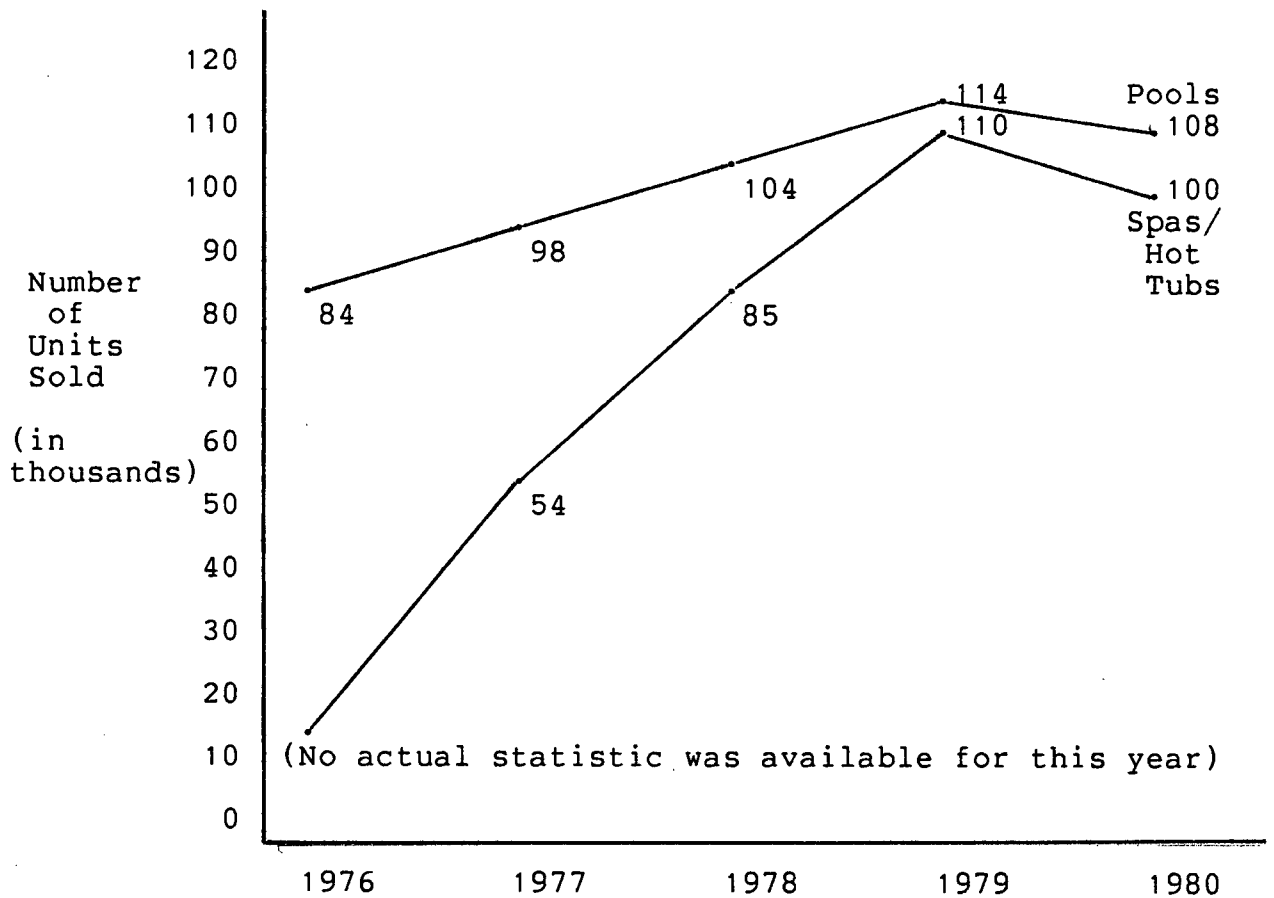
North American tradition has generally accepted varying degrees of limitations upon government intervention into the private use of products and services, depending upon their perceived effects. The perceived effects of pools and spas upon public health has been a major rationale for government involvement in this industry.<sup>6</sup> This is particularly true where such facilities are publicly used. This study is focused on the public spa and hot tub sector of the pool and spa industry.

Despite the brief history of spas and hot tubs, they have become a substantial portion of the currently estimated total pool/spa market of \$3-\$4 billion annually. With approximately 100,000 spas/hot tubs sold per year at an average retail price ranging between \$2,500 and \$5,000 (modest figures), new sales of spas/hot tubs and necessary support equipment alone account for \$250 to \$500 million annually. On the basis of experience with pools, after-market items such as chemicals, replacement

equipment/parts, and services would probably double this figure. Therefore, it is reasonable to place the estimated total spa market sales somewhere in the neighbourhood of \$1 billion annually. Thus, it would constitute approximately  $1/4$  to  $1/3$  of the total pool/spa market. The percentage of dollar market share contributed by spas to the total is remarkable considering their relative newness and the fact that prices for spas/hot tubs are generally  $1/3$  to  $1/2$  the price of an average pool. (Note: all figures are merely approximations based upon market survey and they represent the U.S. market only.)

An even more interesting comparison is, as shown in the graph below, the number of units of pools and spas/hot tubs sold per year. As one can see, in only four years, sales of spas and hot tubs have almost equalled pool sales annually.

Pool Sales vs. Spa/Hot Tub Sales 1976-1980



(Source of statistics: "Swimming Pool Industry Market Reports", Hoffman Publications)

Although sales dipped slightly in 1980, this reflects the downturn in the general economy at that time, not the true growth trends. Future sales predictions are optimistic for spas/hot tubs except under exceptionally poor general economic conditions. The figures still reveal an astounding growth pattern, and this has had a substantial influence on industry and consumer behaviour. Over 2/3 of the swimming pool contractors now also sell spas, averaging 13 sales per year per contractor.<sup>7</sup> Manufacturers of pool and spa products have targeted the spa market for extensive advertising and promotion efforts.

Consumers have clearly adopted spas as a recreational alternative. Actual statistics of spa use are not available. However, on the basis of information on public swimming pool use and a general idea of the size of the spa market, it is reasonable to assume that spa users number in the millions and that a good deal of spa activity occurs in public facilities.<sup>8</sup> Unlike public pools, unfortunately, there are no reliable figures on the number of public spas in operation. Queries directed to public officials about the number of units in existence receive vague and unsure replies. This is due to the fact that permits for spa/hot tub installations (unlike pools) are not generally required; and where they are required, provisions are difficult to enforce (for the obvious reason that spas can be installed without easy detection). However, to provide an idea of the numbers of public spas we may be dealing with, the Illinois Dept. of Public Health estimates that there

are a minimum of 2,200 units in operation in Illinois.<sup>9</sup> In comparison, British Columbia (which does require permits) approved 75 permits for "therapeutic pools" in 1980 and 92 permits in 1981. This represents a large increase over the number in 1977 of 23 permits. It is conceded that permitted "therapeutic pools" are a conservative estimate of actual public spas and hot tubs in operation in the province.<sup>10</sup> Spa market information likely will improve in the future, yet the statistics so far are sufficient to demonstrate the magnitude of their sudden growth.

Editorial material by various magazines and newspapers support this observation and indicate some of the social changes resulting from the growth.<sup>11 12</sup>

Stories and articles abound with regard to the various uses and social influence spas and hot tubs have had. The variety and number of social behaviours involved with spas and hot tubs are far too extensive to document here. But it is evident that the overall social impacts are consistent with and have contributed to the generally increased societal emphasis on values related to health, fitness, recreation, and relaxation.

### An Explanation for the Rapid Growth of the Spa and Hot Tub Market

What are the reasons for this rapid growth and sudden interest in spas as a recreational amenity? The tremendous



growth rate is attributable to a strong demand for spas and, apparently, a sufficient supply.

Industry/spa operator interests on the supply side and consumers on the demand side perceive large benefits through growth of the spa market.

The industry's motivation for promoting growth is obviously economic, both in its efforts to stimulate consumer demand and to meet the response. Specifically, for the industry, the spa market means:

1. A vast new market opportunity, as spas do not distract from pool sales and sometimes may promote pool purchases.
2. A potentially greater market in the long term, for the reason above and also because of the tremendous after-market, particularly in chemicals.
3. The relative ease and speed of installation allows freedom from traditional pool construction drawbacks such as: weather constraints (causing delays, inconvenience, and seasonal slow-downs), high capital investment, extensive labor requirements and problems, and cash flow problems. In some instances, retailers simply sell "do-it-yourself" spa packages, freeing themselves even more from potential profit-draining problems.

The owners of public spa operations similarly are motivated by the market's profit potential. To some, it offers a brand

new area of business endeavor, and to others, spas may serve to enhance the overall facilities of a recreational operation. The growth of the market is both attractive to spa operators and also acts as a force for meeting competition in the recreational field. Operators, too, both stimulate and meet consumer demand.

What are the roots of the consumer demand for spas? We may categorize spa consumer demand as being based on two broad incentives; (1) social-recreational and (2) therapeutic. The social-recreational incentive is quite apparent, and it represents a choice by consumers amongst a large number of alternative activities. Such a demand is subject to considerable fluctuations over time, and thus, it may be difficult to predict usage as a result of this motivation. The therapeutic incentive, however, is the interesting one, particularly to this case study. Increasingly, consumers and physicians are looking at spas for therapeutic reasons, not just for arthritis and stiffness, but for many other health sufferers, including paraplegics and multiple sclerosis patients.<sup>13</sup> One doctor describes the benefits this way; "the heat increases blood circulation while the water provides buoyancy, which makes movement easier. The hydrotherapy reduces stiffness and soreness."<sup>14</sup>

The positive health effects of spas are still a matter of dispute, however.<sup>15</sup> On a scale ranging from extreme (and perhaps unfounded) therapeutic claims to arbitrary dismissal of any benefits and to all points in between, medical and health

experts have no solid agreement on this issue. If anything, the majority of experts seem to believe that there are beneficial effects; but as to the exact benefits, their purpose, their extent and under what conditions may be anybody's guess. The U.S. Internal Revenue Service supports the case for spas as a therapeutic device. Under Section 213 of the Internal Revenue Code, the entire costs of installing and maintaining spas are tax deductible where the use is essential to the treatment of a disability.<sup>16</sup> Further, in interviews with spa personnel, operators and managers felt, based upon their experience and comments from their customers, that spas do definitely have very beneficial health results.<sup>17</sup>

It may be a while before spa therapeutic benefits are fully understood, but the perceptions of their therapeutic worth have gained a foothold. If that foothold becomes firmly planted, either as a perceptual reality or as a proven medical fact, we can safely predict that spas will become a very major health consideration -- no longer just simply a "fad" or a substantial portion of the relatively small pool/spa total market. It presents a troublesome conflict for policy-makers, involving delicate balancing between protecting the public from health hazards in one direction, while simultaneously seeking to improve public health in another direction.

Implications of the Spa and Hot Tub Market Development  
for the Establishment of Policy

An understanding of the historical development of the spa market may explain government delay in establishing spa policies and current policy difficulties in dealing with potential hazards and uncertainties associated with spas. The following implications may be reasonably drawn:

1. The strong perception of spa benefits by industry, spa operators, and consumers may have diverted attention away from consideration of potential hazards associated with spa use.
2. The development of the spa market from the existing swimming pool industry led many people to assume that spas were similar to swimming pools with respect to engineering construction, maintenance, and management standards. Since public swimming pool policy has been acceptable and stable for many years, the need to examine potential spa use hazards was not initially perceived.

Thus, the manner in which the spa market developed obscured the need for policy considerations of potential hazards and uncertainties. Issues relating to the public health and well-being of spa users and the general public were not raised to any significant extent. As a result, present policy to protect public health should begin with a thorough examination of the potential hazards.

#### Summary

We can draw several conclusions from examining the emergence of the spa market:

First, the growing demand and supply of public spas has been firmly established and may likely increase in the future. Yet, even if not one more public spa were constructed, there are enough already in operation to merit consideration. Hence, as previously stated, spas, as public matters, are here to stay.

Second, there is much vested interest in the preservation and growth of the public spa market and this is distributed among the industry, spa operators, and spa users. Consequently, a good deal of potential conflict exists if action is taken which increases the perceived costs imposed on any of these groups (but also, on the other hand, proper and effective policies and management are advantageous to all concerned).

Third, should a failure to regulate spas to provide reasonable public health and safety protection result in major public health problems, strong public pressures for government action could develop.

Fourth, the sudden emergence of spas as a public health concern creates new challenges to scientific and political communities to find ways of protecting public health and safety. Information on public health effects of spas is sketchy (and in some areas, non-existent). But despite the uncertainties that now exist, government may be required to act before a solid scientific basis develops for managing spas in a manner that will assure reasonable protection of public health and safety.

In order to appreciate the difficulties faced by those who

must deal with spas, we need to examine the nature of the risks and uncertainties which may be confronted by efforts to regulate public spas in the public interest.

### Footnotes - Chapter 1

<sup>1</sup>U.S. Dept. of Health and Human Services, Suggested Health and Safety Guidelines for Public Spas and Hot Tubs, Report of the Public Health Service, Centers for Disease Control (Atlanta: Centers for Disease Control, 1981), p. 1.

<sup>2</sup>Diane Newton, "Evolution of the Spa Industry", Pool & Spa News, September 21, 1982, pp. 41-42.

<sup>3</sup>Hoffman Publications, Inc. Swimming Pool Industry Market Report, (Ft. Lauderdale, Fla., 1980), p. 8.

<sup>4</sup>Great Lakes Biochemical Co., Inc., Spa & Hot Tub Water Maintenance, (Milwaukee, Wis., 1979), p. 3.

<sup>5</sup>Cranford K. Gibbs, "Letters to the Editor", Pool & Spa News, February 9, 1981, pp. 6-7.

<sup>6</sup>Robert Janis, "SPEC Meets on Governmental Affairs", Pool & Spa News, April 5, 1982, p. 16.

<sup>7</sup>Hoffman Publications, op. cit., 1981, p. 3.

<sup>8</sup>"RAB Instant Background: Swimming Pool Dealers", Survey supplied by WGN Radio, Chicago, Illinois, 1979, pp. 187-188.

<sup>9</sup>Interview with Dave Antonacci, Illinois Dept. of Public Health, Engineering and Sanitation Division, Springfield, Ill., July 7, 1982.

<sup>10</sup>Interview with William Withers, British Columbia Ministry of Health, Preventive Services, Victoria, B.C., August 27, 1982.

<sup>11</sup>"Hot Tubs & Spas -- The Joys of Tubbing", Better Homes and Gardens, Remodeling Ideas, Winter 1980/81, p. 118.

<sup>12</sup>"Getting Yourself Into Hot Water", Sunset Magazine, Sunset Ideas for Hot Tubs, Spas, & Home Saunas, August, 1979, p. 5.

<sup>13</sup>Helen Donigan, "Spas Mean Hydrotherapy", Pool & Spa News, September 21, 1981, p. 58.

<sup>14</sup>Ibid.

<sup>15</sup>Clare Fleig, "Hot Water: It's Time Tested Cure, Doctor Claims." Pool & Spa News, February 23, 1981, p. 29-30.

<sup>16</sup>MacKenzie Canter III, "Uncle Sam May Help Sell Pools and Spas", PS Magazine, (Washington, D.C.), October/November 1980, p. 6.

<sup>17</sup>Interviews with various operators in Chicagoland area, June-July 1982.

## CHAPTER 2

### The Characteristics of Risks and Uncertainties in Regulation of Public Health Hazards Associated with Spas and Hot Tubs

#### Definitions of "Risks" and "Uncertainties"

Potential health hazards related to spa use may be classified into four broad categories: pathogenic, hyperthermia (related to water temperature), visual (related to water clarity), and drowning (related to hair and body entrapment from the spa aeration system). Managers face numerous uncertainties in dealing with these hazards. To explore the uncertainties in spa management, we need to distinguish between the terms "risk" and "uncertainty" and clarify the distinction between them. For the purposes of this thesis, a framework provided by Quade<sup>1</sup> is used.

A situation of risk is defined as "one in which all possible outcomes are known, together with the odds of each occurring. What is not known is the particular outcome that will occur."<sup>2</sup>

A situation of uncertainty is defined as "one where the underlying probability distribution is unknown."<sup>3</sup>

The distinction between risk and uncertainty is that "in a risky situation the random event comes from a known probability distribution, whereas in a situation of uncertainty the probability distribution is unknown and must be chosen



subjectively."<sup>4</sup> By use of the terms "chosen subjectively", it is meant that experts can be called upon in some cases to evaluate a situation and make judgements based upon their knowledge. Both of these types of uncertainties are considered "stochastic uncertainties" because probabilities attached to their possible occurrence have some logical basis.

There is another class of uncertainties which may be called "real uncertainties". Real uncertainties have no logical basis for an assignment of probabilities to a potential situation of risk. Uncertainties which depend on the deliberate actions of people or changes in individual and social preferences (i.e., human behaviour and values) and predictions about future states of the world fall within this category. Uncertainties which could be eliminated by gathering of additional information, but where doing so would be excessive in cost or time, might for all practical purposes also be considered real uncertainties. We can classify the various uncertainties into these areas:

1. Uncertainties which can be eliminated and/or reduced to risks by gathering additional information.
2. Uncertainties which could likely be reduced to risks by judgement.
3. Uncertainties which are real and cannot be eliminated or reduced to risks.

For facility, we will label and refer to these uncertainties as: (1) informational uncertainties, (2) judgement uncertainties, and (3) real uncertainties. After examining the

public health concerns and potential hazards of spas and hot tubs, we will specify pertinent risks and uncertainties in accord with the above definitions and distinctions.

#### Spas and Hot Tubs: Public Health Concerns

In acknowledging spas and hot tubs as a viable health and recreational alternative, we must then address the question: are they truly a public health concern? The answer is unequivocally "yes". Spa users are, without doubt, exposed to hazards as a direct consequence of public spa and hot tub operation. This conclusion is supported by the Center for Disease Control (a division of the U.S. Dept. of Health and Human Services, hereafter referred to as "CDC"), which states that:

The spa and hot tub industry is currently expanding into states which do not have adequate regulations to control the health and safety features of these facilities. Epidemiologic evidence has shown that spas and hot tubs can be of significant public health concern if they are not properly designed, operated, and maintained.<sup>5</sup>

Even the business and industry interests who profit from encouraging spa use do not deny the existence of potential hazard to some degree.

The U.S. Consumer Product Safety Commission (CPSC) issued a press release in December, 1979 warning of the hazards of drowning in spas from exposure to water

exceeding 104°F, and also in combination with use of alcohol.<sup>6</sup> The report states:

There were an estimated 200 emergency room-treated injuries in 1979, and 1,100 in 1980 which were associated with spas. The CPSC has on file, records of 30 residential spa-associated deaths, 22 occurring in 1979, 6 in 1980 and 2 in the first half of 1981. Heat and alcohol were cited as contributory or causal factors in 12 of these cases; drowning with no specific causal factor was cited in 13 cases; 2 drownings were said to have resulted from the victims being rendered unconscious as a result of a fall and head injury prior to drowning; and one death was caused by electrocution. There are 2 deaths and 2 cases of near drownings resulting from hair entanglements in spa drains. There are 6 deaths and one injury reported which occurred in a commercial or public location. These 7 cases have been determined to be out of scope for this report.<sup>7</sup>

CPSC Cases Involving Spa Fatalities  
January 1, 1979 - June 14, 1981

| Hazard Pattern                                        | Number |
|-------------------------------------------------------|--------|
| Drowning - Heat and Alcohol Contributing Factors      | 12     |
| Drowning - Cause Not Specified                        | 13     |
| Drowning - Hair Entanglement                          | 2      |
| Drowning - Rendered Unconscious from Fall/Head Injury | 2      |
| Electrocution                                         | 1      |
| Drowning - Commercial/Public Location                 | 6      |
|                                                       | --     |
| Total                                                 | 36     |

(U.S. Consumer Product Safety Commission/HIEH)

Since the time of this report an additional 41 (as of August, 1982) deaths have occurred. In June, 1982, a recall was made of 125,000 drain cover fittings sold nationwide by one manufacturer, as a result of two drownings and a third near-drowning.<sup>8</sup> Significantly, the CPSC report shows a large

increase in emergency room-treated injuries and continuing deaths from 1979 to 1980.

Some states also view the problems quite seriously. For example, the state of Oregon has banned public hot tubs\* (not spas) outright. Their own research and experience with hot tubs has led them to conclude that the bacterial organism, *Pseudomonas aeruginosa* which primarily causes skin rashes, is uncontrollable in these units and can be extremely deleterious. (Note: although the reader should be aware that there are other strains of *Pseudomonas*, this study will use "*Pseudomonas*" solely in reference to *Pseudomonas aeruginosa*; any other strains referred to will be specifically named). Municipalities, such as a group of villages in the Chicago land area which compose the Northwest Municipal Conference, have begun to devise regulations specific to public spas. Although no serious accident has yet occurred in their particular jurisdiction, those health officials are aware of problems elsewhere and see potential dangers. As stated by one member, "We don't want to have to write an ordinance after a drowning or serious disease problem has occurred."<sup>9</sup>

In field research, every individual interviewed, regardless of background, expressed some measure of concern over the health and safety hazards. There is no dispute as to whether or not

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\*The distinction between spas and hot tubs is important here because porosity of the wood construction materials of hot tubs was considered more of a hazard than other spa construction materials (e.g., fiberglass and concrete).

hazards exist. Divergence of opinion begins with issues such as the degree of hazard, the probability of occurrence, the likelihood of reducing or eliminating the hazard, the amount of hazard which should be allowed, and questions regarding spas as being merely associated with the hazards in contrast to being the cause. There appears to be virtually unanimous agreement that maintenance, management, and operational factors are the principal elements that determine hazard exposure and outcomes. Although a few people view proper spa management as a hopeless task, the vast majority of experts think that the health hazards can be brought under control through careful operation.

However, spa management entails dealing with complex technical and scientific matters in which significant uncertainty appears to exist. In order to identify the uncertainties and demonstrate how they complicate technical and normative aspects of policy development, an understanding of the relationship between spa water quality characteristics and the potential hazards is important. The following sections describe these technical and scientific areas and illustrate the key weaknesses where uncertainty has frustrated establishment of policy.

### Potential Hazard Areas

The safety and health hazards involved in spa usage can be examined by classifying the problems into four areas:

1. disinfection and control of pathogenic hazards
2. hyperthermia hazards
3. visual hazards from poor water clarity
4. drowning hazards from the spa aeration system

In each area, there are a number of specific hazards of varying degrees and probability of occurrence. However, all three areas are legitimate concerns that have been documented as problems by public and/or private sources.

#### 1. Pathogenic Hazards

The growth of bacteria, viruses, and fungi in the spa environment constitute one of the major sources of health hazards. This potential hazard area is one of the most important public health concerns, and it also poses the most difficulties for spa management.

#### Managing Spa Water Quality to Control Pathogens

The main concern in water quality management for spas (like pools) is to prevent growth of bacteria, viruses, and fungi, and the spread of infectious diseases. These pathogens can be

introduced from the source of water supply, the air, or by bathers. The higher temperatures of spa water are conducive to the growth of many of these pathogens. In order to achieve the water quality objectives, indicators for disinfectant levels, pH, total alkalinity, hardness, total dissolved solids, and trace metals are used. These parameters, as with any body of water, have bearing upon the ability of the disinfectant (usually chlorine or bromine) to act upon the pathogens. The factors which affect pool and spa water quality include:

#### I. Physical Factors

- A. Filtration
- B. Circulation
- C. Temperature

#### II. Chemical Factors

- A. pH
- B. Total Alkalinity
- C. Calcium Hardness
- D. Total Solids
- E. Langelier Saturation Index of Corrositivity or Scaling Tendencies
- F. Trace Elements

#### III. Biological Factors

- A. Disinfection
- B. Shock Treatment for removal of chloramine ammonias, and organic materials
- C. Algae control

Standards for these factors have worked reasonably well for pools, but even pools have problems. One study has indicated that of 193 pools investigated, "105 failed to meet state requirements for residual chlorine levels, and 106 of these failed to have proper pH ranges."<sup>10</sup> However, it is generally recognized that a properly trained and conscientious individual

can fairly easily maintain proper water quality in pools. "Pseudomonas bacteria probably would not be a problem in pool environments if proper maintenance requirements are not violated, or unless the inherent characteristics of the pool make it difficult to maintain those requirements."<sup>11</sup>

This has not proven so for spas.

Due to the high temperatures maintained in whirlpools, and the frequent high intensity activation of the water, proper free disinfectant residuals are difficult to maintain. Frequent monitoring of these pools throughout the day is necessary to assure that the proper free disinfectant and pH is maintained. Since frequent monitoring is difficult to achieve, the potential for Pseudomonas and other pathogenic contamination is always present. It is our contention that heated whirlpools will continue to be marginal operations from the standpoint of swimmer health, and perhaps public health agencies should run exhaustive water quality tests on these types of pools to determine if they can continue to be allowed as safe to use.<sup>12</sup>

It was first thought by most people that spa water quality management would not be a problem, because we have had a good "track record" with swimming pool water quality. It was thought that spas would simply be an extension of pools, and that they could be treated as "baby pools". The emergence of spas in large numbers has proved this false. There is a lack of experience with the highly variable conditions of spas as a result of these important differences:

1. High Water Temperatures cause rapid evaporation of water and increase the concentration of dissolved solids.
2. Heavy Bather Loads (a function of spas' small size) and hot water results in high concentrations of body oils, skin flakes,



and other organic wastes which contaminate the water.

3. Aeration Effects, resulting from increased velocity and heat, rapidly change the chemical character of water, which in turn accelerates chlorine loss, affects pH, and increases the possibility of excessive foaming. Depending on local air quality conditions, aeration may also introduce more dirt into the water.<sup>13</sup>

What difficulties do these unique spa factors present for the maintenance of water quality?

First, difficulties in predicting water quality stem from the wide variation in the conditions that affect spa water quality. The principal variations are found in (a) the physical and chemical characteristics of the spa water, (b) the presence of biological and organic materials in the spa water, and (c) the numbers and kinds of individuals using spas. These conditions can vary from spa to spa or with one spa over time. High variability in spa water quality is caused by four main factors:

1. Variations in the numbers and kinds of spa bathers and the consequent differences in the amount of biological and organic material introduced to the spa and differences in the amount of exposure they bring to disease organisms.
2. Variations from time to time in the extent to which disease organisms exist in a given local environment, apart from being carried into spas by bathers.
3. Differences in local water supplies and the physical

environment (i.e., air, sunlight, etc.)

4. Variations caused by spa operator manipulation of physical and chemical factors (e.g., chemical treatment, operation of spa filtration equipment, water level, etc.)

Spa water quality may respond dramatically to each of these factors because of the high water temperature, heavy bather loads, and aeration in spas.

The indoor pool and spa at the UBC Aquatic Center illustrates the effects of bather loads in creating highly varying conditions. The pool contains approximately 800,000 gallons (U.S.) of water and the spa has roughly 2,000 gallons. "Bather load", defined as the number of persons per volume of water over time, would by comparison be as follows:

- each person in the spa would be equivalent to 400 people in the pool.
- thus, 10 people in the spa (a common occurrence) would be equal to 4,000 people in the pool!

By regulation, the pool is not allowed to have that many people in at one time. But if such a bather load were permitted, the effects of the biological and organic materials upon the water chemistry would be tremendous and make maintenance difficult. For health and safety reasons, we would not tolerate (and probably could not deal with) the number of pool users suggested by our illustration. Yet with spas, our perceptions are deceived by looking at the absolute number of people, rather than the more important proportion of users to

the volume of water. The significance of this is the important effect of bather load upon spa water quality and that the ratio of users to water quality is highly variable.

The relationships amongst spa water quality parameters are complex in themselves, but as the above example shows, an additional or "marginal" user in the small volume of spa water can have tremendous effect on the parameters. Calculating the proper chemical water balance also becomes extremely difficult, because the number of users, time spent in the spa by each user, and the portion of the users' bodies immersed in the water all fluctuate greatly. The possible combination of factors and use is not only infinite, but attempts to develop artificial limits are complicated by the tight tolerances imposed by the relatively small volume of water. Casual, broad, or careless division of factors and use can lead to significant errors which might be far less noticeable in pools.

Second, the relationship between water quality conditions and number of spa users is not readily predictable and requires close monitoring and observation in order to maintain "safe" conditions. Water quality parameters, such as pH, total alkalinity, total dissolved solids, and disinfectant levels, are subject to dramatic changes, which may be non-linear and also lead to rapid deterioration in water quality. There is evidence to show that even under seemingly stable pH and chlorine ranges in pools (ranges which meet normal standards), that extreme fluctuations occur in the hypochlorous acid (i.e. the

bactericide agent) curve and that closer monitoring of chlorine and pH levels is essential for maintaining the desired water quality.<sup>14</sup>

The effects of different individuals upon the water quality parameters can sometimes be more significant than the number of users. Spa temperatures increase secretion of body oils. Further, people bring many "foreign" materials (e.g. dirt, deodorants, etc.) into the spa. The amounts of bodily and "foreign" materials differ from individual to individual. It cannot be readily predicted when the effects of different users will cause parameter thresholds to be exceeded and water conditions drastically altered. An illustration of this is an actual incident which involved two separate spas with similar conditions, management, and number of users. In one spa, disinfectant levels were difficult to maintain and general water quality was poor. An extensive investigation revealed that the problem was related to high amounts of skin particles in the water from a group of frequent users who also often suntanned.<sup>15</sup>

Therefore, management practices cannot be simply based on theoretical correlations between number of spa users and water quality parameters. It is difficult to define what is an "average" user or group of users for purposes of adjusting parameters to meet certain conditions. If incorrect judgements are made with respect to the possible effects of different users, it becomes considerably more difficult to determine what management procedures are needed to restore water quality.

Thus, it is critically important that frequent and effective monitoring systems are used in spa operations so that "surprises" may be avoided.

Third, spa water quality is complicated by the fact that corrective measures for adjusting the water chemistry are hindered by the small volume of water and its consequential rapid, dynamic nature. Normally with pools, chemicals (e.g., chlorine for disinfection and hydrochloric acid for lowering pH) are metered or otherwise administered to the pool so as to build up a "bank" of disinfection (as in the case of chlorine) or to gradually reduce the pH (in the case of acid). With spas, tight tolerances make gradual adjustments necessary, but they are also difficult to administer accurately, more prone to error, and leave little room for safety margins. Thus, attempts to compensate, and especially over-compensate, for water quality problems can create worse problems. We know, for instance that excessive addition of acid can lower pH too rapidly under certain conditions, hence affecting bathers, disinfection capability and spa equipment. Extraordinarily high levels of chlorine or bromine may be hazardous in the spa itself or in waste water discharges elsewhere. In each case, we must ask; can the "cure" be worse than the "disease"?

We can summarize the three main difficulties of maintaining spa water quality:

1. Wide variations from location to location and from time to time - which create problems in maintaining acceptable

water quality conditions.

2. Non-linearity between water quality parameters and number of users - which creates the problem of predicting spa water quality trends and prescribing remedial measures.
3. Potential dangers of corrective measures - which precludes the possibility of over-compensating to build a wide margin of safety.

These problems could conceivably be substantially reduced by very extensive human or mechanical monitoring. However, such monitoring is an expensive and/or difficult process which so far has not been widely considered worthwhile or feasible. The conclusion is inescapable that spa management is a difficult task, particularly for untrained or poorly-trained spa operators.

#### Controlling Specific Pathogens\*

The concern with this problem relates to the identification of the pathogenic organisms which already appear to be associated with spas or are potential recognizable hazards. In spas, individuals are particularly susceptible to pathogens, not only because of the temperature and water chemistry factors discussed early, but also because the body is stripped of its normal "debris". Dilation of pores and pounding from whirlpool action release protective oils and dead skin. This has two

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\*Note: See Appendix A for a more comprehensive discussion of pathogenic hazards.

effects; first, it provides a nutritional source for organisms and second, it provides an entry pathway into the skin (but not the body). The body, upon cooling down after spa use, can trap the organisms in the skin pores. Festering or irritation may then occur on the body. This sequence is fairly typical of pathogenic problems relating to skin rashes and minor infections -- a relatively common problem from spas.

Pseudomonas aeruginosa - This organism has so far been given the most attention. Known as causing what is commonly called "swimmer's ear" in pools and lakes, this bacteria has been identified as a major source of skin rashes resulting from spa use. Outbreaks of the disease appear in 8 to 48 hours after exposure and usually disappear in three to seven days.<sup>16</sup> Symptoms include: itching, ear pain, weakness, headache, sore throat, axillary lymphadenopathy, and painful breasts.<sup>17</sup> These characteristics are well-agreed upon, but there is disagreement over other aspects, such as other hazards from *Pseudomonas*. From one health official:

If these were the only potential health problems, we wouldn't be as concerned about it as we are. But there are other potential problems it can cause. If it becomes a systemic infection involving the blood stream, then there is a fairly high probability of mortality.

Systemic *Pseudomonas* infections usually occur in people who have primary health impairment, such as burn victims, or people who have gunshot or puncture wounds. Arthritic individuals are susceptible too, because they are usually put on immuno-suppressant drugs, and a lot of physicians are prescribing spa pools as therapy for arthritis.<sup>18</sup>

The mortality rate referred to is estimated at 40 percent

if *Pseudomonas* enters the bloodstream.<sup>19</sup> However, this positive statement about the danger of death from *Pseudomonas* in a spa is disputed by an industry researcher who calls it "supposition" and that a more accurate answer would be "It's impossible to say."<sup>20</sup>

A number of other controversial questions surround the *Pseudomonas* bacteria. Among them is the question of the ability to kill the organism by chlorination and also the chemical parameters favorable for growth.<sup>21</sup> Studies seem to indicate that chlorine does kill *Pseudomonas*, but that many other factors, such as pH, temperature, organic material, and other chemicals can significantly influence the effectiveness of chlorine as a bactericide.<sup>22</sup> Compounding the problem is the fact that *Pseudomonas* has the capability of producing a slime coating around itself if it can find some porous opening in a material which allows attachment. Hence, wood tubs or poorly maintained spas with scale build-up may permit *Pseudomonas* to attach itself, rendering chlorine less viable as a disinfectant. Another question relates to the associative factors of *Pseudomonas* with spas. Research by members of the Recreational Water Quality Criteria Program (U.S. Environmental Protection Agency), suggests that the presence of the organism is more directly linked to certain individuals and other environments, and that there is no conclusive evidence of a cause and effect relationship between densities of the bacteria in water and incidence of infections.<sup>23</sup> Additional research on *Pseudomonas* is continuing, but at the present, there are still many serious,



unanswered questions. Despite the ambiguity, the consensus is that *Pseudomonas* does pose some measure of health hazard for spa users -- for what reasons and under what conditions, we are not sure. As noted by one health official; "You don't have outbreaks in scummy water necessarily. One of the cleanest tubs I've ever seen was loaded with *Pseudomonas*."<sup>24</sup>

The largest outbreak to date occurred in Atlanta, Georgia in March, 1981, involving 75 people.<sup>25</sup> Other various states, including Colorado, New York, Oregon, Minnesota, Alabama, and North Carolina have also reported significant incidents. Many other state and local health officials have isolated *Pseudomonas* cultures in public spas, even if they experienced no outbreaks. Thus, this particular bacterial organism may deserve careful monitoring and perhaps further study. Special work on this problem is, in fact, currently being conducted by one of the world's leading experts on *Pseudomonas*.<sup>26</sup> From the industry, two chemical companies have run testing. Bio-Lab, Inc. of Decatur, Georgia has done laboratory testing and Olin Corp. of New Haven, Conn. has conducted in-field testing. Both tests showed chlorine was effective against *Pseudomonas*, but the conditions and chlorine levels differed between the two studies. The most significant and consistent results of the two tests appear to be that constantly maintained free chlorine levels are important to prevent the establishment of *Pseudomonas* in the spa water. The director of one of the tests underscores the necessity of proper spa water quality management; "It is my opinion that these outbreaks occur because of poor or no attempt to maintain

sanitized water."<sup>27</sup>

Legionella pneumophila - This organism produces "Legionnaire's Disease" -- a disease discovered several years ago and diagnosed as responsible for the deaths of many American Legion conventioners who stayed at one hotel in Philadelphia. In the past year, public health officials in Montpelier, Vermont reported isolation of *L. pneumophila* in hot tubs.<sup>28</sup> This has been substantiated by others, and research in New York has indicated that people using spas have 10 times the chance of contacting the disease.<sup>29</sup> The CDC Legionella Branch is actively involved in further work on this.

However, some experts do not think that the Vermont incident is good epidemiological evidence because *Legionella* appears to be a ubiquitous water organism. The CDC affirms this cautionary note; "there are 50,000-70,000 instances of *Legionella* per year. Being an aquatic organism, it is also found in lakes, streams, moist earth, and even shower heads in hospitals."<sup>30</sup> Far less is known about this disease than *Pseudomonas*, and currently, the focus is on determining causation-association factors.

Although the geographic locations and temporal relationships of these findings are of interest and suggest that environmental isolates may be somehow associated with the outbreaks, they must be interpreted cautiously. This is because investigators have recovered LDB from locations in which cases had recently occurred, but treatment on removal of the putative environmental source of LDB did not prevent the continued occurrence of human infection and disease.<sup>31</sup>

Thus it is highly unfair to single out spas in association with the disease. Regardless, the serious nature of Legionella requires us to consider it a possible public health hazard with spas and to protect against its occurrence in the same degree as in any other aquatic environment.

Pontiac Fever - The CDC has recently discovered possible evidence of a link between this disease and spas.<sup>32</sup> It is derived from the Legionella organism, but it produces different symptoms. Individuals suffer influenza-type reactions, which, for our case of spas, definitely complicates source identification. Information in any significant detail on this disease is not currently available and little can be said about it except to note its possibility as another public health hazard with spas.

Other Pathogenic Hazards - Traditional water quality concerns of Staphylococci and Streptococci also figure as possible hazards of spas, but only in a minor way. Some health officials have reported the isolation of strep in spas, yet it should be noted that strep virtually has to be ingested or maintain entry through an open wound to be a problem. In reasonably careful use of spas, this is rarely a concern. Herpes and other social diseases have been raised as possible hazards, but for the most part dismissed. Although such diseases are not impossible to contact in spas, they are not considered hazards related to spas because they require physical contact, which clearly could take

place anywhere. Lastly, viruses such as polio and hepatitis are likewise dismissed as spa concerns. Viruses generally require ingestion and their presence relates to our overall environment.

These other pathogens cannot be characterized as special public health hazards related to spas, but neither can they be totally ignored, especially in the cases of staph and strep. Spa water quality management does have to follow normal sanitation procedures practiced elsewhere as prevention from these pathogens. Further, as noted by one biochemist, "mutation of bacteria occurs all the time."<sup>33</sup> New, previously unknown pathogens (Legionella being a prime example) can appear, so we cannot feel too secure about our current level of knowledge. We need to be on guard.

Perhaps the bacteriological health hazards of spas can best be viewed and summarized from a statement by an official from the Illinois Dept. of Public Health. To paraphrase his comments: "Pools and spas should be considered as places where people congregate. Those who have diseases can spread them there and this could happen in any public area of gathering."<sup>34</sup> Regardless of our knowledge (or lack of), this statement makes a good deal of sense. Spas in public facilities will always increase health hazards to some extent. Additional information about these potential hazards should help us to make better decisions, but recognition of this broad statement provides reason to remain alert to potential hazards without necessarily condemning any specific facility prematurely or

without just cause. Until we develop clear documentation and accepted evidence of any of the pathogenic hazards, a cautious yet aware approach might be our best at this time.

Public health protection against pathogenic hazards would involve:

1. Development of spa water quality management standards and guidelines which eliminate or control pathogenic organisms in spas.
2. Spa operator understanding of spa water quality characteristics and procedures for preventing degradation of water quality and adherence to the standards.
3. Spa user understanding of potential pathogenic hazards, recognition of poor water quality conditions, and avoidance of unsafe spa environments.
4. Resolution of uncertainties in regard to both the potential pathogenic hazards and spa management procedures for reducing the hazards.

## 2. Hyperthermia Hazards

Other health and safety factors should be considered apart from the chemical and biological concerns. The first of these factors is high water temperature which can create problems of hyperthermia. Spa operators must be aware that the spa water quality characteristic of temperature may require special management precautions to protect certain users from harm.

Hyperthermia occurs when deep body temperature is higher

than the thermoregulatory "setpoint". The human tolerance is within  $\pm 4^{\circ}$  of the normal  $98.6^{\circ}\text{F}$ . In general women are less heat tolerant than men and small persons of either sex are at a disadvantage when exposed to thermal extremes. Heat (hyperthermia) can cause drowsiness, lethargy, vasodilation, cardiodepression, decreased myocardial contractibility, hypoglycemia, hypertension, respiratory depression, decreased cerebral blood flow and altered cerebral tissue compliance.<sup>35</sup>

The potential health hazards from high temperatures are relatively well-understood, and the suggested maximum limit of  $104^{\circ}\text{F}$  ( $40^{\circ}\text{C}$ ) is commonly accepted now. This guideline is based on knowledge that the human body begins to lose its ability to cool itself at temperatures above  $104^{\circ}$ . It is further recommended that a maximum limit of 10 to 15 minutes in a spa, at one time, should be observed. Some people are more subject to hazard, and the general recommended guidelines may be unsafe to them. Determining acceptable levels for these cases is difficult, and the problem of users being unaware of their personal health defects can also exist.

Prolonged spa usage can be dangerous for the "average" person, but any length of use by elderly people, people with medical problems (e.g., high blood pressure, diabetes, cardiovascular, circulatory impairments, etc.), and anyone under the influence of alcohol or other drugs, even in moderate amounts, is likely to be dangerous.<sup>36</sup> Research and experimentation at the University of Washington School of Medicine also indicates that pregnant women must take special precautions, as temperatures greater than  $102^{\circ}\text{F}$  for more than 15 minutes can endanger the developing embryo or

fetus.<sup>37</sup> Establishing other guidelines for who may use spas, at what temperatures, and for what length of time is an important, but also ambiguous, matter.

The work of the CPSC and the University of Washington medical school is helpful for developing health and safety guidelines. However, shortcomings still remain. One of these is the lack of information about changes in blood pressure or heart rates in relation to spa water temperatures. Such indicators could be helpful in devising operational standards. The tests on pregnant women at the University of Washington used vaginal and rectal temperatures as indicators, but these are obviously impractical for normal operational purposes. Another shortcoming is the absence of information about the kinds and numbers of "near-misses" -- cases where people have felt dizzy or lethargic in spas, but got out before an accident occurred. As suggested by Victoria Brown of the CPSC, this type of information would greatly aid in establishing better preventative measures.<sup>38</sup> The largest single drawback is our inability (due to ethical, practical and other considerations) to conduct extensive testing on humans. As a result, we have to accept estimates and ranges which leave open hyperthermia hazards for susceptible individuals. There is really not much that can be done to improve this area of knowledge, but certainly individuals who have the slightest doubt of their ability to withstand the high temperatures are strongly recommended to consult their physician beforehand.

### 3. Visual Hazards from Poor Water Clarity

This problem area is not as serious as pathogenic and hyperthermia concerns, but it still deserves water quality consideration beyond mere aesthetic reasons. First, it is a factor which can affect disinfection considerably. Lack of clarity can be attributed to a number of parameters such as dissolved solids, high pH, excessive foaming, and an abundance of the "foreign" substances mentioned earlier. Inadequately sized or poorly maintained filtration systems can also be a factor. All of these affect the ability of the disinfectant to work effectively. For example, "as the total dissolved solids build up in the water, the sanitizer (whether chlorine or bromine) becomes surrounded by these dissolved solids and cannot attack and kill bacteria and algae. A high level of total dissolved solids also affects pH. There is yet no agreed upon general standard, but it appears that a level of about 1,500 ppm is the maximum level of total dissolved solids that should be tolerated in a spa."<sup>39</sup> The other parameters important to achieving clarity limit disinfection differently, but their effects on clarity can be as extensive as the effects from high levels of dissolved solids.

Second, poor water clarity can be an observational problem obscuring the presence of broken glass or other dangerous objects that may be in a spa. Conceivably, it could also prevent us from noticing a drowning person, especially a small child. Also, users and operators might be unaware of missing or



broken grates or outlets -- conditions which engineering studies show increase the chance of hair or body entrapment.<sup>40</sup>

The instances of water clarity problems with public spas seem to be quite high, mostly in heavily-used facilities. Since this is easily noticed as a problem, it is frequently reported and, unlike pathogenic hazards, it is not difficult to identify. Water clarity problems in spas relate primarily to bather load, and after a time, it becomes virtually impossible to clear the water through filtration and chemical treatments. The only solution then is to drain the unit completely, clean it thoroughly, and refill with fresh water. This requires conscientious maintenance, varying with each spa operation. Thus, guidelines recommending intervals for draining are difficult to establish on a uniform basis. Nevertheless, this problem must be addressed to accomplish proper spa water quality management.

#### 4. Drowning Hazards Related to the Spa Aeration Systems

A final health and safety hazard relates to the aeration systems in spas. For in order to generate the water pressure necessary for aeration, circulation or booster pumps must be sufficiently sized to produce flow rates which are much greater than normally required without aeration. Velocities generated by these pumps tend to pull people or portions of a person's body toward drain surfaces or other spa water outlets.<sup>41</sup> This leads to possible hair or body entrapment whereby individuals

cannot release themselves from the outlet. If entrapment occurs underwater (where outlets are generally located) the person may drown. If an individual's head is not submerged but entrapment prevents leaving the spa and help is unavailable, the possibility of hyperthermia danger arises.

Factors such as: (a) Improperly designed circulation systems; (b) swimming pool-designed outlets (note: there are outlets for spas with special grate covers); and (c) broken outlet grate covers all can increase the possibility of entrapment occurring. Thus, spa operators must be aware that the spa water quality characteristic of circulation has an effect on safety measures for preventing entrapment. Filtration is also an important aspect of spa management in regard to entrapment, as water clarity allows easier detection of improper or broken outlet grates and victims of entrapment (this is especially relevant to very young children; the CPSC's reports show drownings from entrapment are highest in the age bracket of children under 3 years old).

Although the aeration system is not a "pure" water quality consideration, it is important to deal with simultaneously in spa management policy, as it is part of the total spa system which controls water quality. Along with heat, aeration produces the principal therapeutic benefits of spas, and thus its consideration cannot be ignored.

The examination of the four main potential hazard areas serve as a background for identifying the specific risks and

uncertainties associated with spa use and for then understanding the difficulties faced in devising spa management policies.

#### Identification of Specific Risks and Uncertainties Within the Potential Hazard Areas

In preceding sections, potential spa hazards areas were identified, and within those areas, it may be possible to itemize specific situations of risk. However, if we apply the strict definition of "risk" as stated above, we would find very few actual situations of risks with spas. The available data base is either insufficient in many areas or it has not been synthesized so that we could reasonably say that probability distributions are known. For instance, it might appear reasonable to designate certain pathogenic hazards, such as Pseudomonas aeruginosa, in the category of risk. But there is inadequate information about the actual number of cases, both reported and unreported. The most logical candidate for accumulating this information on a national basis in the U.S. would be the CDC. Yet, to date, they have not accumulated a record of disease-related deaths or illnesses associated with spas.<sup>42</sup> Further, there is no data available on actual numbers of spa users. Hence, an assessment of the probability of a spa user becoming infected by Pseudomonas from spa use does not have statistical validity at this time. There appear to be only two potential hazard areas where we currently could specify risks consistent with our definition. These are:

1. Hyperthermia hazards - Previously cited studies and literature on the effects of heat/alcohol provide us with a reasonably sound basis for determining risks in this area. Spa use by pregnant women, and individuals who are under the influence of alcohol or drugs, exemplifies situations which can be identified as risks.
2. Drowning hazards from spa aeration systems - The effects of hair and body entrapment are well-documented. And the risks of drowning from entrapment could be specified, particularly if visual hazards exist.

This is not meant to imply that we have actually gone to the effort of specifying these risks. However, the evidence for labelling these items as risks seems to be overwhelmingly agreed upon and acknowledged. Beyond these acknowledged spa risks, we enter situations of uncertainty.

#### Informational Uncertainties

In spa management, there are a number of uncertainties which could be eliminated, reduced, or changed to stochastic uncertainties by additional information. For example:

- A. In relation to pathogenic hazards
  1. The range of pathogens which could exist in spas and under various conditions is not known, but an assembly of available knowledge could change the current situation of uncertainty.

2. For any one spa, we do not know the actual types and numbers of pathogens present or being introduced by bathers, but conceivably testing or monitoring methods could provide information to change the uncertainty.
3. The range and effectiveness of possible preventative measures against various pathogens in spas is not sufficiently known.
4. The specific effects of physical and chemical factors upon disinfection efficacy in hot water chemistry is not fully known. (Note: most factors are known, but a few are still open to question.)

B. In relation to hyperthermia hazards

1. The effects of spa temperatures upon blood pressure and heart rates could be determined through assembly of existing medical knowledge.
2. Statistics about the kinds and numbers of "near-miss" hyperthermia cases occurring in spas are not available.

C. In relation to poor water clarity hazards

1. The specific effects of physical and chemical factors upon water clarity in hot water chemistry is not fully known. (The same applies here as for disinfection efficacy.)
2. The relationship between biological factors and water clarity in hot water chemistry have not been fully identified.

### Judgement Uncertainties

These uncertainties tend to have some relationship to informational uncertainties, in that judgements can be assisted by increasing information. Judgement uncertainties, however, involve interpretation of data where attachment of probabilities to outcomes strongly depends upon the weight attached to various inputs of available knowledge. This is differentiated from informational uncertainties which can be reduced through accumulation of data and application of linear analysis.

#### A. In relation to pathogenic hazards

1. The probability of various pathogens entering the spa environment requires judgements about which potential pathogens should be considered for a particular geographic or socio-economic area (e.g. is cholera still a concern in North America? How much?)
2. The probability of various pathogens infecting individuals and causing disease depends on judgements about individuals' resistance to a disease.
3. The probable results of preventative and control measures (e.g., with the use of disinfectants) require judgements regarding the "correct" combination of other factors such as the following;
  - i) the appropriate level of disinfectant to maintain at all times
  - ii) appropriate methods and intervals for testing/monitoring disinfection residuals and pathogenic organisms

iii) the quantity or dosage of disinfectants required per bather or per gallon(s) of spa water over time.

iv) appropriate intervals and quantities required for effective superchlorination.

(Note: it may be that taking these uncertainties together and trying to assign a probability risk to one specific individual in a specific spa at a specific time is too much of an analytical task, and therefore becomes a real uncertainty.)

#### B. In relation to hyperthermia hazards

1. In advising individuals having special physical characteristics, the probable "safe" delineation of spa temperature settings requires medical judgements.
2. The management procedure(s) which would be most likely effective in detecting users whose prior physical condition make their exposure to spa temperatures unsafe requires both medical and practical judgements.

#### C. In relation to poor water clarity hazards

1. The estimated risk of disease associated with various time intervals for draining spa waters for specified bather load/water quality ratios.
2. The probable amounts of water loss from evaporation and splash-out and the resulting effects upon the spa water chemistry.
3. The probable bather and external environmental effects (e.g., dirt, sunlight) upon key interrelated chemical

parameters.

4. The estimated risk of disease associated with different intervals for testing/monitoring water clarity.

### Real Uncertainties

#### A. In relation to pathogenic hazards

1. The actions of spa operators and public health officials toward implementing recommended control and preventative measures is not determinable in any true probabilistic sense. Actual behaviour can only be estimated in practical terms as a basis for establishing management policies, and such estimations would involve judgement. However, until information about spa actor behaviour is developed and judgements made, behavioural factors in spa use remain real uncertainties.
2. The actions of spa users which might contribute to the spread of infectious disease both internal and external to the spa environment is also not determinable in any true probabilistic sense.
3. The acceptable level of pathogenic risk for spa users, especially future spa users, depends on individual and social values which can shift over time. Thus, acceptable levels cannot be predicted for the future.
4. Our ability through design, engineering, or sanitation practices to eliminate or virtually eliminate pathogenic hazards can never be specified as it would invoke



predicting a "future state of the world."

5. The probability of emergence of previously unknown pathogens immune to normally-practiced sanitation procedures also cannot be predicted.

B. In relation to poor water clarity hazards

1. The behaviour of spa users, operators, and health officials toward implementing recommended procedures and norms.
2. The acceptable level of risk from poor water clarity for spa users, especially future spa users.

C. In relation to hyperthermia hazards

1. The behaviour of the various spa users toward observing and enforcing precautionary temperature warnings
2. The acceptable level of risk from temperature for spa users, particularly for those individuals most susceptible to problems.

It is important to note that when information and judgement uncertainties exist, they remain real uncertainties for management purposes until the information is generated or until steps are taken to apply expert judgement to convert uncertainties to risks.

As an additional note to our discussion of uncertainty, we must be careful not to take "facts" related to hazards for granted. Areas where uncertainties have been eliminated or reduced to risks may be still subject to real uncertainty both

in a technical and behavioural sense. Advances or discoveries in the medical, biological, and genetic fields can be revolutionary and yesterday's "facts" may become today's myths. For example, recent studies indicating the ability of the *Pseudomonas* organism to produce a protective slime coating against chlorine has raised questions about the "facts" involved in killing this organism. Also, we always need to question the real ability of individuals to understand and retain available information intended to reduce hazards. Real uncertainty is not limited merely to deliberate behaviour. We can never predict when individuals will fail to comprehend communications. The assumption that "everyone certainly understands something" can be dangerous. These types of "veiled" real uncertainties suggest that we should avoid over-reliance upon any one "fact" for overall policy success or for critical outcomes to an individual's health.

### Major Policy Difficulties Arising from Spa Management

#### Uncertainties

The uncertainties involved with spa water quality management are manifested in four major areas of difficulty. These difficulties cannot be resolved, except normatively, because of their strong tie to the judgement and real uncertainties. Examining each difficulty separately:

1. The difficulty of defining (a) the extent to which spas create public health and safety hazards and, (b) the precise

nature of the hazards they create.

How do we define the precise nature of spa hazards so that policies can be designed to deal effectively with the hazards that exist?

With visual hazards from poor water clarity and drowning hazards from entrapment, relationship between health hazards and spas has been reasonably well determined and no real difficulty exists. Hyperthermia is slightly more difficult. Medical evidence has provided reasonably good information about hyperthermia, yet doubts do remain since temperature and duration thresholds are not totally defined.

Disinfection and control of pathogenic hazards pose a major difficulty. One health official interviewed indicated that there are only remote chances of securely linking a disease problem to a specific source, as doing so requires prompt investigation, careful and accurate analysis of very complicated relationships -- and a good deal of luck.<sup>43</sup> The dynamic and variable nature of spa water compounds the difficulty of determining cause. Epidemiological studies are commonly used as an attempt to overcome the difficulty, but this method is often subject to strong criticism.<sup>44</sup>

This difficulty is important to our policy considerations because it "cuts both ways" in affecting our ability to judge health hazards. In the direction of trying to protect public health, it becomes difficult to document cases convincingly

enough to stimulate and initiate action. Despite reports of disease outbreaks, many public health officials have had no problems in their jurisdiction. Is the lack of reported incidents in a jurisdiction due to a true absence of problems or the public's inability (or lack of awareness) for relating problems to spa usage? Some of the diseases such as rashes are quite common and may not show up for several days after spa exposure. Thus, individuals may not see the link between the disease and spa use. An example is Pontiac Fever, where it is unlikely that individuals would relate flu-like symptoms to their use of a spa.

Conversely, for much the same reasons, spas may receive incorrect blame for a disease. The *Pseudomonas* bacterial problem may be an example. Research indicates that it is normal to find large numbers of *Pseudomonas* in many environments and that infection may be more predominantly related to factors other than human exposure to the organism.<sup>45</sup> Even if *Pseudomonas* is prevalent in other environments and their presence in spas is unimportant, are spas still the cause because their high temperature dilates pores allowing entry? Or would the cause be related to the decision of a user to remove a bandage on a wound while in the spa, thus choosing this particular environment for exposure to *Pseudomonas*? Therefore, we also have the possibility raised that although spas may be the actual locational source of a problem, the wrong factor may be identified. Hence, we might erroneously emphasize disinfection in our policy considerations at points where other management

considerations may be more important.

The foregoing discussion indicates that the difficulty of defining the hazards associated with spas creates two types of problems for policy development. First, it may not be easy to define the hazards convincingly enough to stimulate action by policy-making officials. Second, because of highly variable conditions of use and intake water, and the uncertainties faced in defining cause-effect relations, it is difficult to prescribe preventative measures that will reduce or eliminate the hazard.

2. The difficulty of balancing health benefits against health hazards in choosing amongst appropriate policies.

This is a central question raised by health officials and the industry. Many people who use spas for health reasons are those who are also most prone to the potential hazards. A person who feels ill and under medication may go into a spa to feel better, but also subjects himself to hyperthermia or pathogenic dangers (the example of arthritis patients has been cited earlier). Tense and stressful persons looking to relax may encounter high blood pressure problems. And people aching from colds or the flu may use a spa whereby their illness not only reduces their resistance to other diseases but also exposes other users to germs.

This difficulty stems from several problems. First, the benefits from spa use and the importance attached to the hazards of spa use varies among individuals in accord with their values

which cannot be precisely measured. Second, the uncertainties in defining hazards and the uncertainties about the physical and psychological effects of spa use make it difficult for an individual to compare benefits and adverse effects in a logical fashion. Third, society has not made a clear determination of the extent to which an individual is entitled to endanger his own health and to endanger the well-being of other members of society. Yet, policies must be developed in the absence of a clear resolution of these problems.

3. The difficulty of establishing standards in the face of wide variability among conditions at different spas and over time.

The three principal variables (spa water physical/chemical characteristics, presence of biological/organic materials, and spa usage by individuals) create a difficulty in devising standards which cover the range of conditions without being vague. If standards are too narrowly formulated, they may be inappropriate or inapplicable to some spa facilities or to a specific spa facility at certain times. If standards are devised too broadly, they may fail to guide operators in spa management and fail to provide users and health officials with a sufficiently precise criterion for evaluating conditions of a spa facility.

An example of this with spas is the guideline for periodically draining the units. An interview with the director of the University of British Columbia Aquatic Centre well

illustrates the dilemma. Upon looking over the CDC spa guidelines, his first remark was "This is nice, but if I followed their recommendation on draining, I would have all kinds of problems."<sup>46</sup> The reason for his comment was that UBC's spa has an exceptionally high bather load, and the CDC's vague guideline of "continuously or at least once a month" is not very helpful. The word "continuously" is unclear and "once a month" would be deficient for that spa. By experience, he thinks that it needs to be drained at least 2-3 times a week. The CDC guideline makes little sense, as an effective solution ultimately rests on the operator's process of trial-and-error and judgement with a specific spa -- and even those solutions may be temporary due to variability factors.

It might be suggested that the drainage question could be solved by choosing a more appropriate parameter, such as number of bathers. The problem with this is that even if we assumed all other conditions could be held constant (not a good assumption), one bather is not the same as the next. Each individual will introduce wide variations of biological and organic material into the spa. Furthermore, simply draining a spa does little good if it is not cleaned properly prior to refilling.

The difficulty rests in the basic characteristics of spas earlier described and applies to many other problems besides the question of draining. The highly variable and volatile reactions of spa water dooms rigidly-formed standards to

failure. Inevitably, exceptions will arise -- and most frustrating of all, there will be many exceptions of all types -- we cannot even make a rule of exceptions! This dilemma hardly eases our worries about developing guidance and assuring some measure of control over hazards, but the existence of high variability is a reality. Consequently, we may be forced to develop ranges which are flexible enough to anticipate variations so that countering actions can be taken. This is reasonable and can still allow standards to be more effective despite the difficulties. For policy to be effective, however, information about the types and sources of variability must be adequately disseminated and operators have to be trained to respond to the varying water quality conditions.

4. The difficulty of predicting or anticipating the behaviour of spa users, spa operators, public health officials and industry representatives.

In working toward developing a framework and evaluation of policy alternatives for public spa management in British Columbia, a background of the case study problems would be incomplete without considering matters of behaviour. The behaviour of spa operators, government agencies, spa users, and the industry is important to establishing appropriate spa management policies.

There is a substantial body of knowledge about individual and organizational behaviour, and where uncertainties exist,



experimentation can increase knowledge of spa actor behaviour. Thus, spa actor behaviour is a difficulty which policy must address, but it is not an insurmountable one. For policy purposes, predicting "average" behaviour of spa actors is important even though it is impossible to predict how a specific operator or user will behave.

The key group for purposes of implementation consists of the spa operators because of their actual day-to-day control over spa water conditions. Certainly, the others have an influence in the process, but spa operators have the most independence and direct involvement.

Speaking for many of the various people interested in spa water quality management, one industry researcher has written, "Keep in mind, regardless of standards developed, chemicals used, or how good the support equipment, unless the operator is knowledgeable on how to maintain the spa, the problems will still exist. To summarize then, the development of standards is not what is important here, it's how those standards are used."<sup>47</sup> Within this statement, the problems related to behavioural considerations are well encapsulated.

The main spa actors can be defined as follows: The term "spa operator" is defined as: an individual (either an owner, manager or other employee of a spa facility), who is in charge of the spa operations on a daily or periodic basis. Operation of spas entails maintenance, monitoring, and management of the spa units.

"Spa Users" are defined as individuals who participate in the use of public spa facilities. Frequency of use is not a determinant for designating individuals as spa users. Spa users do not constitute the general public, per se; the term "non-users" may later be applied to the population which never uses public spas.

"Public Health Officials" include all the individuals who directly work for public health agencies within any jurisdiction. These people are involved in the daily administration of public health legislation. Legislators, outside scientists, consultants, or others who indirectly deal with public health agencies are not included in this category.

"Industry representatives" are individuals employed by profit and not-for-profit organizations involved in the pool and spa industry. These people may directly interact with the spa operators or they may have indirect links through the manufacturing industry to consumer business chains.

A detailed characterization of these actors is provided in Appendix C along with suggestions about how to account for their behaviour in policy development and implementation. As both a significant real uncertainty and a strong factor in influencing the eventual outcome of spa management policy, behaviour is an important consideration, yet our institutional abilities to deal with it are often inadequate. The importance of the behaviour of spa actors for policy design is illustrated by the following list of questions.

1. What incentives can be provided to induce spa operators to manage their facilities so as to minimize health hazards?
2. How can users be motivated to take suitable precautions to protect their own health and help to minimize hazards to other users and non-users?
3. How can public health officials be motivated to function in a constructive way to upgrade spa operations?

Scientific studies of organizational and individual behaviour can provide a basis for constructive experimentation with policies that are responsive to human behavioural characteristics.

#### Basic Issues Involved in the Regulation of Spas

The identification of uncertainties associated with spa management and the resulting difficulties these uncertainties pose for policy development serve to clarify the basic issues which policy design must address. These basic issues are:

1. How are users of spas to "protect" themselves or be "protected" from potential impairment of their health resulting from spa use? Further:
  - What is the responsibility of government?
  - What is the responsibility of the user?
  - What is the responsibility of spa operators?
2. How are non-users of spas to protect themselves or be protected from potential impairment of their health resulting from spa operations? How do users protect

themselves or be protected from other users?

- Again, what is the responsibility of government, of operators, and of users?

3. If government does regulate, control, or influence (e.g., by incentives) spa operations, how should it go about deciding what measures to institute?

- What should be the role of scientists and other experts?

- What should be the role of the bureaucracy?

- What should be the role of operators, users, and non-users (the general public)?

- What should be the role of elected officials?

4. If government is involved in "informing" users and non-users about risks, uncertainties, and appropriate spa use, how does it proceed in developing "reliable" or "accurate" information?

- What should be the role of scientists, government personnel, operators, industry, the general public and elected officials in deciding upon the content and procedures for such communication?

5. How should government regulations or incentives be implemented so as to be effective?

6. In view of uncertainties, advances must emerge from experiment and experience. How can creative advance and learning be fostered and facilitated?

The issues thus emerge from examination of the risks, uncertainties, and difficulties associated with spa management. To select any form of policy for public spas these issues must

be addressed within the context of whatever premises our design of policy is based. In the next chapter, a framework is developed as a basis for evaluating design of policy for British Columbia.

## Footnotes - Chapter 2

<sup>1</sup>E.S. Quade, Analysis for Public Decisions, 2nd edition (North Holland; New York, Amsterdam, Oxford): Elsevier Science Publishing Co., Inc.), 1982.

<sup>2</sup>Ibid.

<sup>3</sup>Ibid.

<sup>4</sup>Ibid.

<sup>5</sup>U.S. Dept. of Health and Human Services, op. cit., preface.

<sup>6</sup>Victoria R. Brown, Spa Associated Hazards - An Update and Summary, U.S. Consumer Product Safety Commission, Washington, D.C., Directorate for Hazard Identification and Analysis Division of Human Factors, May, 1981, p. 1.

<sup>7</sup>Ibid., p. 3.

<sup>8</sup>"Drownings Spur Recall of Spa Part," Chicago Tribune, June 26, 1982, Section 1, p. 17.

<sup>9</sup>Interview with Daniel Tarry, Environmental Health Office, Village of Arlington Heights, Illinois, July 13, 1982.

<sup>10</sup>Maj. William J. Sausker et al., Pseudomonas Folliculitis Acquired from a Health Spa Whirlpool, Journal of the American Medical Association, June 2, 1978, p. 2364.

<sup>11</sup>William J. McCausland and Paul J. Cox, "Pseudomonas Infection Traced to Motel Whirlpool", Journal of Environmental Health, March/April 1975, p. 458.

<sup>12</sup>Ibid.

<sup>13</sup>Great Lakes Biochemical, op. cit., pp. 5-6.

<sup>14</sup>Rand Green, Pool & Spa News, "Water Chemistry Workshop; Part II", August 17, 1981, p. 59.

<sup>15</sup>Interview with George Watson, Great Lakes Biochemical, June 28, 1982.

<sup>16</sup>John Washburn et al., "Pseudomonas aeruginosa Rash Associated With a Whirlpool," Journal of the American Medical Association, May 17, 1976, pp. 2205-2207.

<sup>17</sup>U.S. Dept. of Health & Human Services/Public Health Service, "Outbreak of Pseudomonas aeruginosa Serotype 0:9 Associated With a Whirlpool," Morbidity and Mortality Weekly Report, Centers for Disease Control, July 17, 1981, p. 324.

<sup>18</sup>Pool & Spa News, "ISTI Backs Pseudomonas Study; Causes, Prevention Sought," February 9, 1981, p. 148.

<sup>19</sup>Robert Janis, op. cit., p. 16.

<sup>20</sup>Interview with John Puetz, Head of Research, Great Lakes Biochemical Co., Inc., Milwaukee, Wis., July 13, 1982.

<sup>21</sup>Test samples of the pseudomonas bacteria were cultured out of Health Dept., but when sent to Bio-Lab, Inc. the organisms died in 30 seconds at 1.0 ppm. Pool & Spa News, op. cit., Feb. 9, 1981, p. 148. Also confirmed in letter and memo from James Miller, Director of Microbiology, Bio-Lab, Inc., July 28, 1982.

<sup>22</sup>G.P. Fitzgerald and M.E. Der Vartanian, "Pseudomonas aeruginosa for the Evaluation of Swimming Pool Chlorination and Algicides," Applied Microbiology, March, 1969, pp. 415-421.

<sup>23</sup>Victor J. Cabelli, Harriet Kennedy, and Morris A. Levin, "Pseudomonas aeruginosa-fecal Coliform Relationships in Estuarine and Fresh Recreational Waters," Journal of Water Pollution Control Federation, February 1976, pp. 367-376.

<sup>24</sup>Pool & Spa News, op. cit., February 9, 1981, p. 148.

<sup>25</sup>CDC, Morbidity and Mortality Report Weekly Report, op. cit., July 17, 1981.

<sup>26</sup>Pool & Spa News, op. cit., February 9, 1981, p. 148.

<sup>27</sup>Letter from James J. Miller, Director of Microbiology, Bio-Lab, Inc., Decatur, Ga., July 28, 1982.

<sup>28</sup>Jorian Clair, Editor, "Reflections," Pool & Spa News, February 8, 1982, p. 6.

<sup>29</sup>Robert Janis, Pool & Spa News, op. cit., April 5, 1982, p. 16.

<sup>30</sup>Jorian Clair, op. cit.

<sup>31</sup>Gary L. Latimer and Richard A. Ormsbee, Legionnaire's Disease, Marcel Dekker, Inc., New York.

<sup>32</sup>Interview with Dr. Ellen E. Jones, CDC, Atlanta, Ga., August 11, 1982.

<sup>33</sup>Interview with John Puetz, op. cit.

<sup>34</sup>Interview with Dave Antonacci, op. cit.

<sup>35</sup>Victoria R. Brown, U.S.C.P.S.C., op. cit.

<sup>36</sup>Victoria R. Brown U.S.C.P.S.C., op. cit. p. 9.

<sup>37</sup>Mary Ann S. Harvey, Marcella M. McRorie, and David W. Smith, "Suggested Limits of Exposure in the Hot Tub and Sauna for the Pregnant Woman," From the Dysmorphology Unit, Dept. of Pediatrics, Child Development and Mental Retardation Center, and the Center for Inherited Diseases, University of Washington School of Medicine, Seattle, Wash., 1980.

<sup>38</sup>Interview with Victoria Brown, CPSC, Washington, D.C., August 10, 1982.

<sup>39</sup>Bob Lowry, "Hot Water Chemistry," Pool & Spa News, February 8, 1982, p. 96.

<sup>40</sup>William N. Rowley, Director of Engineering and Gordon F. Ehret, Chief Engineer, Swimquip, a Division of Wylain, Inc., "Primer on Suction Entrapment in Swimming Pools or Therapeutic Pools".

<sup>41</sup>William N. Rowley and Gordon F. Ehret, ibid.

<sup>42</sup>Interview with Dr. Steve Cochi, Respiratory and Special Pathogens Branch, CDC, Atlanta, Ga., January 27, 1983.

<sup>43</sup>Interview with Daniel Tarry, op. cit.

<sup>44</sup>William W. Lawrance, Of Acceptable Risk, Science and the Determination of Safety, (Los Altos, Ca.: William Kaufman, Inc., 1976), pp. 13-14.

<sup>45</sup>Interview with Dave Antonacci, op. cit. (also may be referenced to the studies by Fitzgerald, et al. and Cabell, et al.).

<sup>46</sup>Interview with Jim Bremner, Director, UBC Aquatic Centre, Vancouver, B.C., July 26, 1982.

<sup>47</sup>Letter from John Puetz, Head of Research, Great Lakes Biochemical Co., Inc., Milwaukee, Wis., April 22, 1982.



### CHAPTER 3

#### How Should Public Spa and Hot Tub Policy Be Designed?

One method of addressing the issues raised in the preceding chapter is to develop a theoretical framework based on literature in the subject area which can then be used to evaluate alternative policies. Unfortunately, in public health areas where situations of risk and uncertainty are complicated by complex technical and scientific matters, the development of a conceptual framework is difficult. Debate in the literature and in practice continues to rage over the best approach to public health hazard problems such as our case study problem exemplifies. The premises contained below are surely subject to disagreement depending on one's perspective. However, they do represent an organized approach based upon widely-accepted views which can be applied to policy evaluation.

#### 1. What is the responsibility of government to protect the health and well-being of users of spa facilities when complex technical and scientific information determine safety?

Economic theory tells us that an efficient market requires that users be informed about the consequences of acquiring a good or service.<sup>1 2 3</sup> Although spa users could inform themselves about spas, the technical information is so complex that acquisition of information would be too costly and impractical for most users. Because the technical information is so

complex, it seems that neither government nor private groups can communicate to a spa user all the information he requires to make an informed choice.<sup>4 5 6</sup>

Therefore, some process in which individuals have confidence must be organized to establish what constitutes reasonably "safe" conditions of use. Uncertainties also need to be specified. Finally, there must be a means to transfer available information into the development and implementation of procedures which assure that "safe" conditions of use are being followed.<sup>7 8</sup>

Thus, if we assume that a liberal democratic system requires that an individual is entitled to "good" information on which to decide whether it is desirable to use a given spa, it is practicable to supply the ordinary user with two items of information: The first item is whether conditions of "safe" use have been established by a legitimately recognized body and second, whether reasonable precautions have been taken to meet those conditions in a spa that a user might utilize. There appears to be no reasonable alternate way for government to supply this kind of information. Users who wish to examine information utilized in determining what constitutes "safe" conditions should have access to it, including information about any uncertainties that have been considered. The system, however, must be geared to the large body of users who cannot afford the costs or employ the skills to make an independent judgement of what constitutes "safe" conditions and to determine

whether such conditions are being met.

It must be recognized that some individuals will require additional information beyond what is referred to above. These are individuals who may be unable to tolerate conditions that are reasonably "safe" for most people. These individuals are entitled to information about:

- a) Individual characteristics (e.g., heart condition, age, pregnancy) which require that special precautions be taken to ensure "safe" use.
- b) The types of special precautions which should be taken for each characteristic.

It is the responsibility of government to see that reasonable steps are taken to inform prospective users as to what these characteristics are and what special precautions are required for each.

It should be recognized that the development and communication of information has costs which may be significant. Industry is generally reluctant to absorb these costs unless developing and communicating information serves their interests. Operators and users, on an individual basis, do not have the ability or resources for developing and communicating information. Thus, government must either provide necessary funds or establish a process for collecting funds from industry, operators, and users.

In short, it is the responsibility of government to

prospective spa users to:

- establish the conditions under which spas can be used with reasonable safety by the average member of the general public.
- provide reasonable assurance that a given spa meets these conditions.
- see that the public has reliable access to information about individual characteristics which require that special precautions be taken.
- see that the public has reliable access to information about the special precautions that should be taken for each characteristic meriting special attention.
- provide public funding or establish a process of collecting funds from the spa actors for development and communication of necessary information.

2. What is the responsibility of government to those who may suffer from the external effects of spa operations?

"Externalities" or "third party effects" may be defined as those positive or negative effects caused by the actions of one individual (or group, firm, etc.) upon the welfare of another without some legally recognizable mechanism for compensation or redress being available.<sup>9</sup>

"Third-party costs" can be imposed upon the general public from spa operations if a spa user contracts an infectious disease from a spa and later infects non-users. Such costs can

also be imposed on spa users by another user in a situation where an individual negligently enters a spa with an illness or open wound and transmits a disease to other users. In both of these cases, a user benefits from spa operations but imposes costs on others without providing compensation (and usually without consent of the harmed party). In a sense, such effects amount to subsidies for the users who benefit but do not bear the full costs of their activities.

Government is the recognized institution for representing the interests of those who may be vulnerable to adverse external effects.<sup>10</sup>

In the case of spa operations these adverse effects take the form of some type of infection or disease. It is impractical to compensate the adversely affected party for suffering these costs because one's health is generally regarded as being beyond monetary value. Therefore, it is the responsibility of government to see that users of public spas and the general public have reasonable assurance that the operation of spas will not impose effects adverse to the health of both users and non-users.

It is recognized that governments cannot provide absolute assurance of such protection. This is partly due to uncertainties and partly due to the impossibility of maintaining absolute control over the performance of spa operators and users. Government responsibility therefore consists of establishing the conditions of safe use and taking steps to

enforce such conditions. Nonetheless, the liability of the negligent operator and of the negligent user must still exist, as it does under our system of laws for other human activities, such as driving an automobile.

3. In view of the technical and scientific nature of spa management, how should government decisions be made which relate to regulation of spa design/operating procedures and to determination of the kinds of information that should be communicated to the public?

What should be the role of scientists, government administrators, spa operators, industry representatives, and concerned members of the public in such decision-making?

In accord with liberal democratic theory, a "good" public decision process takes into account the preferences of the affected parties, which are determined by their values and interests. When preferences differ, elected representatives are responsible for weighing these differences and deciding what course to pursue. In order for the affected parties -- users, operators, industry representatives, and members of the general public -- to decide upon their policy preferences, they need to be well informed about how alternative management policies will affect their individual objectives and what risks and uncertainties are associated with alternative policies.<sup>11</sup>

<sup>12</sup> Since effects and the means of modifying them are determined by such complex methods as the engineering design of spas, the

chemistry of water and disinfectants, microorganism growth and human physiology, scientists must be employed to generate most of the factual information that affected parties require to determine their preferences. Securing effective participation and understanding of alternative management policies by all the affected parties involves costs (e.g., for public awareness seminars, pamphlets, etc.) These costs must be accounted for in order for the decision-making to function properly. The decision-making system must, therefore, have the following key features:

1. Alternative management policies should be conceptualized by all of the affected parties on the basis of information supplied by scientists with appropriate specialties.
2. Government administrators should facilitate the decision process, but not engage in the role of decision makers. They should facilitate (a) the utilization of qualified scientists, (b) the communication of scientific information to the qualified parties, and (c) negotiation among interested parties to achieve consensus.
3. Where agreement cannot be reached, elected representatives or individuals accountable to them should have the responsibility for deciding; where it is necessary for decisions to be authoritative, elected representatives or individuals accountable to them must have responsibility for (a) enacting necessary legislation, (b) for establishing appropriate regulations, and (c) for carrying out implementation programs.

4. In order for the decision-making process to properly function in accord with liberal democratic principles, there must be funding provisions for costs incurred to encourage the participation and understanding of alternative policies by all affected interests. Further, there should be channels established which allow all of the other actors to appeal decisions to elected officials or individuals accountable to them.

In summary, government decisions respecting legislation and/or regulatory policy toward spa management should use the expert judgements of scientists, health officials, and industry wherever possible. However, the entire decision process and development of information should be open, accessible, and competitive with all affected interests being represented throughout all stages of the process. Government decisions should also provide mechanisms for representative groups to challenge the decisions in the future. An on-going interactive decision process amongst all affected interests is vital for dealing with the spa issues laden with risk and uncertainty.

#### 4. What determines the effectiveness of implementation measures?

Government implementation measures are generally classified into two categories: (1) regulatory controls (or directives) which are monitored through enforcement procedures, and (2) incentives which are aimed to induce behavioural changes in



those people targeted by policy objectives.<sup>13 14</sup>

It is unlikely that regulation through enforcement officials would be fully effective.<sup>15</sup> First of all, officials cannot be present in spa operations at all times to ensure compliance. Second, problems can occur if enforcement officials are overly permissive or negligent. Third, spa operators may find ways to circumvent regulatory controls. Fourth, monitoring and enforcement procedures may involve costs which are beyond public health budgetary constraints. Finally, regulation through enforcement officials does nothing toward reducing uncertainties or motivating spa operators to go beyond minimum compliance.

Although some potential hazards associated with spas can be reasonably defined as "risks" (e.g., drowning from entrapment, certain known effects from hyperthermia) and conditions for controlling these hazards can be easily specified and enforced, a broader base of implementation measures is necessary to assure "safe" conditions in public spas.

Effective implementation of spa management activities would require: (a) well-trained operators, (b) educated users and a basis for users to have some degree of checking on the adherence to "safe" conditions, (c) periodic monitoring of spa facilities and appropriate penalties for failures to comply with the standards determining conditions of "safe" use, and (d) provisions for funding monitoring and enforcement procedures.

An effective system of implementation measures should make provisions for the following:

1. Educating operators to understand:
  - (a) how the spa system functions, including its engineering, chemical and biological aspects.
  - (b) the rationales for any standards or conditions the spa system is expected to meet.
  - (c) the techniques to utilize under changing conditions in order to adhere to standards.
2. Providing each user with readily understandable information on the standards or conditions that a spa is expected to meet and providing, to the extent practicable, simple means whereby users can check to see if standards are being met.
3. Providing users with readily understandable information about individual characteristics that require special precautionary measures and instructions about how to take such precautions.
4. Requiring periodic monitoring by an appropriate government agency and having provisions for fines and closures when standards are being violated.
5. Establishing monitoring/enforcement procedures which are either within public health budgetary constraints or obtaining funds from other sources.

Thus, the existence of continuous variable conditions and our desire to see operators exceed minimum compliance create practical limitations to effective implementation of approved standards through typical regulatory procedures.<sup>16</sup> More

effective measures appear to be best instituted through developing procedures for users to act as a check on operators and then to use incentives for motivating operators toward higher spa management norms.<sup>17</sup> To accomplish either of these goals, it is necessary to establish an environment for a social learning process to take place, so that both operators and users can develop the capability to effectively interact with each.

#### 5. What factors influence the rate of social learning?

This is a very critical policy area for both effective implementation and the attainment of higher spa management norms under conditions of uncertainty. Uncertainties will always leave doubts about: (a) whether our approved standards are adequate, and (2) whether attempts to exceed these approved steps are "appropriate" or "safe".<sup>18</sup> Thus, a process for social learning is necessary to provide guidance and to deal with uncertainty.

A social learning process can be described in detail using sociological and psychological principles. For simplification purposes, the definition of a social learning process will be limited to mean "a recursive or iterative process" whereby feedback mechanisms allow evaluation of results from which corrective actions can then be taken to adjust conditions. This process is ongoing. More complete descriptions of a social learning process are provided by Mack,<sup>19</sup> Dunn,<sup>20</sup> and others. However, the important element to policy considerations is the

recognition that creative efforts are vital to dealing with uncertainty and raising standards in spa management.

Uncertainty is a dominant characteristic of the spa management problem. The primary uncertainties relate to: (a) the nature of pathogens in the spa environment and ways of controlling the spread of disease, (b) the physical effects (e.g., water temperature, disinfectants, etc.) of the spa environment on certain users, and (c) the way users, operators, and public officials will respond to various public health arrangements in actual spa management practices.

A conscious and determined effort is needed to profit from experience so as to reduce the foregoing three categories of uncertainty and thus improve the capability of spa management practices to protect public health. This recognition applies especially to areas of real uncertainty which pose the greatest threat to disrupting policy objectives since we may be least prepared to handle unpredictable events or behaviour (e.g., appearance of a new pathogenic organism in spa environments, malicious or extremely careless actions by operators, etc.)

Previous discussion of the difficulties of effectively enforcing regulatory control measures indicates that users, operators, and public health officials need to be stimulated to participate in the effort to reduce all three categories of uncertainty and apply the knowledge gained to improving spa management practices. Existing uncertainties and expected continuation of variable conditions in spa environments require

greater knowledge to be gained about pathogens, physical effects, and spa actors' behaviour and stronger assurance that spa operators can deal with variable conditions where guidance from standards is unavailable (e.g., the earlier stated problem of determining intervals for draining spas).

Although penalties may be necessary to enforce regulations and standards, they are unsuited to social learning. Psychological and sociological literature emphasizes positive motivation and reinforcement as being the most successful factors in areas where positive learning is important to the outcome of situations.<sup>21</sup> Studies of comparative health care situations also indicate that positive incentives are required for groups to identify and report relevant experience and to design improved management practices based thereon.<sup>22</sup> Finally, it should be noted that incentives should not be thought of solely in economic terms. Factors of pride, altruism, and learning curiosity can also be used to advantage in developing incentive measures.<sup>23</sup>

Positive incentives may require current and future expenditures. These costs should be anticipated and planned for as best possible within current understanding of spa management needs to resolve uncertainty.

The above considerations lead to the conclusion that a "good" system of spa management requires that:

- Public health officials and operators are made keenly aware that the reduction of uncertainties and the

capability to deal with surprises is the most challenging task faced in spa management.

- Positive incentives are provided to stimulate public health officials, operators, and users to engage in a concentrated effort to reduce the three categories of uncertainties.
- A system for funding the social learning aspects to create awareness of uncertainty and to provide positive incentives must be established to meet current spa management needs and to anticipate future needs.

This concludes the discussion of theoretical premises for consideration of spa policy design. Although any one of the areas are worthy of exhaustive discussion, it is hoped that the reader has been able to conceptualize the main thrust of these premises and their relation to the policy design. The final section of this chapter distills from these premises evaluative criteria which can be applied to alternative policies.

#### Criteria for Evaluating Alternative Spa Policies

From the preceding discussion of the theoretical premises needed for addressing spa management policy issues, a variety of areas have been covered to provide a basis for judging the merits of existing and proposed policies. These premises can be reduced to evaluative criteria applicable to spa management experience in the U.S. and Canada and to designing a model policy for British Columbia. These are as follows:

Criterion 1 - Has government acted to establish conditions that provide reasonable assurance of "safe" use of public spas and hot tubs?

- a) Government must take positive action to identify conditions (governing standards) which, if followed, provide reasonable assurance that a spa is "safe" to use by most members of the general public and that the health of non-users will be protected.
- b) Government must take positive action to identify the characteristics that some people may have which require that special precautions be taken to avoid health hazards from spa use.
- c) Government must establish procedures for identifying public spas that adhere to standards for "safe" use by most members of the general public.
- d) Government must establish procedures that assure members of the public reliable access to information about individual characteristics that require special precautions be taken, as well as instructions about how to take such precautions.
- e) Funds necessary to achieve the above sub-criteria should be provided.

Criterion 2 - Are "safe" conditions of use established through processes in which users, operators, and the public have confidence?

- a) Alternative government management policies for spas must be conceptualized by all affected parties (users, operators,

industry representatives, and the general public) on the basis of information supplied to them by qualified scientists.

- b) Procedures should exist through which an effort is made to reconcile differences of preferences among affected parties with regard to government management policies for spas.
- c) Where agreement cannot be reached, procedures should exist for decisions to be made by elected representatives or individuals accountable to them.
- d) Funds should be provided to see that decision processes for establishing "safe" conditions can be undertaken in conformance with the above sub-criteria.

Criterion 3 - Are effective processes utilized to implement conditions which assure "safe" use of public spas?

- a) Provisions must be made to educate operators to understand the functioning of spa systems, the rationale for approved standards, and techniques to utilize (under changing conditions) to adhere to standards.
- b) Procedures must exist for informing users about standards and conditions of "safe" use and, to the extent practicable, provide simple means for users to check on whether standards are being met.
- c) Procedures must exist for seeing that individuals are informed of individual characteristics that require precautionary measures be taken and that individuals are instructed as to how to follow such precautions.



- d) An appropriate government agency must periodically monitor spa operations and administer penalties of fines and possibly closures when standards are violated.
- e) Funds should be provided to enact implementation measures, and future needs should be considered. Funding obtained from users, operators, or the industry should be considered as an alternative.

Criterion 4 - Do spa management processes stimulate the progressive advancement of knowledge in order to reduce uncertainty and thus provide a basis for improved spa management?

- a) Public health officials and operators must be keenly aware that the reduction of uncertainties and the capability to deal with surprises is the most challenging task faced in spa management.
- b) Positive incentives must be provided to stimulate public health officials, operators, and users to engage in a concentrated effort to reduce the three categories of uncertainties by an on-going social learning process. This process should involve recognition of key indicators of spa problems from experience and adjustment of management practices in accordance with this new knowledge.
- c) Funds to provide positive incentives and establish a social learning process should be provided.

These criteria can be used to qualitatively evaluate the U.S.-Canadian experience with spas, as well as to guide the

design of a model spa policy for British Columbia. The criteria also become a means for judging the effectiveness of future implemented policy. The next chapter uses the theoretical premises to test the actual experience to date with spa management in the U.S. and Canada. By comparing the theoretical premises with actual experience, a range of reasonable alternatives for policy is examined, and deficiencies are identified.

### Footnotes - Chapter 3

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<sup>14</sup>Economic Council of Canada, op. cit.

<sup>15</sup>Andrew R. Thompson, Environmental Regulation in Canada: An Assessment of the Regulatory Process, (Vancouver, B.C.:

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<sup>16</sup> Zeckhauser and Zook, op. cit.

<sup>17</sup>Graham Atkinson and Jack Cook, "Regulation: Incentives Rather Than Command and Control", pp. 211-218, Mancur Olson, op. cit.

<sup>18</sup>Fischhoff, et. al., op. cit.

<sup>19</sup>Ruth P. Mack, Planning On Uncertainty, (New York: John Wiley & Sons, 1971).

<sup>20</sup>Edgar S. Dunn, Jr., Economic and Social Development: A Process of Social Learning, (Baltimore: John Hopkins Press, 1971).

<sup>21</sup>Johnathan L. Freedman, J. Merrill Carlsmith, and David O. Sears, Social Psychology, (Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1970).

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<sup>23</sup>Ruth Mack, op. cit.

## CHAPTER 4

### Experience in the U.S. and Canada

There has been a different response in each country to the emergence of spas and hot tubs as a public health and safety concern. We need to look at experiences in both and then, by using the criteria of the previous chapter, existing practices can be evaluated as a guide to structuring set of policies for British Columbia.

#### Background of the U.S. Experience

##### Scope of Study

Investigation of the U.S. experience with spas consisted of a review of the literature and interviews with the various spa actors (a list of main sources are provided in the footnotes at the end of this chapter). The kinds of literature which were examined include; (1) pool and spa trade journals, (2) newspaper articles, (3) magazine articles, (4) pool and spa standards, codes, and guidelines, (5) manufacturers' product literature, specifications, and instructions, (6) government agency reports, (7) scientific studies, (8) public health journals, and (9) correspondence.

Personal and phone interviews were conducted with; (1) federal, state, and local public health and safety officials, (2) members of the National Spa and Pool Institute, (3) industry

scientists and other representatives, (4) spa operation owners, managers, and maintenance people, (5) independent scientists and researchers, and (6) spa users and non-users.

Federal, state, and local jurisdictions were examined to varying degrees. The research focused on the following jurisdictions:

1. Federal (the two main agencies involved; CDC and CPSC)
2. The State of Illinois
3. The State of Oregon
4. Cook and DuPage Counties in Illinois
5. The City of Chicago
6. Various suburban municipalities outside Chicago (e.g. Arlington Hts., Mt. Prospect, Schaumburg, Downers Grove, Palos).

The states of Illinois and Oregon were chosen because they represented the two extremes of regulatory activity with spas. Illinois has not regulated public spas (with the minor exception of issuing construction permits when spas are built with new public pools). Oregon has been one of the most active states with spas and has devised separate standards and codes for spas. The local jurisdictions also represented a range of regulatory activity with spas. The survey of the literature and information from interviews provided further knowledge about other state and local jurisdictions. This information supplements and helps substantiate the information obtained from Illinois and Oregon.

Initial research indicated that spa regulation, based upon the application of swimming pool standards and codes, was a deficient practice, and hence jurisdictions which have continued in this practice were not examined. The reasons for this conclusion are as follows:

1. The CDC guidelines and CPSC reports clearly show that federal officials have recognized the necessity of treating spas separate from pools.
2. Quotes in trade journals and through interviews indicated industry representatives also agreed that separate spa standards were necessary.
3. The state of Oregon, which has regulated spas for several years, chose to adopt separate spa standards and codes after realizing the problems in trying to control spa hazards by the use of pool criteria.
4. Public health officials in Illinois indicated they would adopt separate spa regulation if funding were available to permit regulation of spas by the state.
5. The local jurisdictions studied also concurred with this conclusion and some are in the process of initiating separate spa standards and codes.

In reviewing the literature and interviewing spa actors, emphasis was placed upon the following categories of information:

1. As perceived by the various spa actors, what are the health hazards associated with spa use and to what extent are spa users and the public exposed to these hazards?

2. What efforts are being taken by government agencies, industry, and spa operators to inform spa users and the public of the potential hazards and about procedures for avoiding conditions of potential hazard?
3. Who determines spa standards and other instruments of regulation? What do these policies consist of and how are they developed?
4. How are existing standards and other policies being implemented by public health agencies and do spa users understand how to evaluate the conditions of particular spa facilities?
5. Do the various spa actors understand what uncertainties are involved in spa management and the importance of dealing with uncertainty in order to improve spa management? What is being done to reduce uncertainties and improve spa management?

#### A Brief Description of the U.S. Experience

A detailed description of the U.S. experience is provided in Appendix D. The following summary is merely intended as a background for the evaluation of the U.S. experience.

As described in earlier chapters, the U.S. initially responded to spas in one of two ways: (1) treating them as small pools or (2) ignoring and avoiding them (due to lack of knowledge and concern about hazards). There were exceptions to this general attitude, mostly in the industry sector, where



anticipation of spa differences stimulated research and product changes/innovations. As information developed, industry experts began to communicate knowledge of spas' characteristic differences throughout the industry and, where possible, to spa operators. Although public health officials may have been aware of the differences at an early date, official action (in terms of legislation, codes, standards, warnings, educational programs, etc.) have been slow in developing and not uniform across the country. In the past year, considerable action has taken place, and thus, a major shift has occurred in the U.S. outlook on spas. This shift can be described as an acknowledgement that spas are significantly different than pools, and hence all matters relating to spa water quality management must be correspondingly adjusted. This recognition, seemingly logical and straightforward, was not quickly gained. Since its acceptance, though, a turning point for activity was reached.

The U.S. approach to spa management can be categorized into three main kinds of policies:

- 1) No regulation of spas
- 2) Regulation of spas using existing swimming pool standards and regulatory controls (this kind of policy is sometimes slightly modified to include a few special provisions for spas, e.g., maximum temperature limits).
- 3) Regulation of spas using standards specifically designed to suit the unique characteristics of spas. Traditional swimming pool regulatory controls are often used in

conjunction with these specific spa standards. Some efforts are usually made to inform users about potential spa hazards and special precautions required and to train/educate operators about standards, rationales, and procedures for adhering to the specific spa standards.

In the jurisdictions studied (either briefly or in depth), the major policy trend appears to be toward the third type of policy where spas are treated differently than pools. Some jurisdictions still use swimming pool standards, but they are in the process of changing to specific spa standards. Fewer jurisdictions fail to regulate spas or continue to use swimming pool criteria, but they still represent significant numbers.

These basic policy approaches form a general basis for evaluating the U.S. experience with spas. For the reasons below, the first two approaches may be generally considered deficient and incapable of meeting the evaluative criteria. The third approach is of most interest to the objective of recommending a set of spa policies for British Columbia. Although serious weaknesses also exist in this approach, it is most instructive to examine the strengths and weaknesses of policies in jurisdictions where considerable efforts have already been directed toward regulating spas.

#### 1) No regulation of spas

The first kind of policy (or more precisely, lack of

policy) is sorely deficient because it denies the role and responsibility of government with public spas. The potential hazards and uncertainties associated with spas are not acknowledged, and hence users and the public are both unprotected and poorly informed about potential public health hazards. As a result, the other three criteria cannot be satisfied.

## 2) Regulation of spas using existing swimming pool standards and regulations

The second kind of policy, used in some jurisdictions, fails to meet the criteria for much the same reasons. This kind of policy fails to meet the criteria because it largely ignores current technical and scientific knowledge about spa management. Although swimming pool standards and regulations may possibly afford better protection for users and the public than no regulation at all, failure of this policy to adequately recognize the potential hazards and uncertainties associated with spas creates deficiencies with regard to all of the criteria.

## 3) Regulation of spas using standards specifically designed for spas

The third kind of policy recognizes the potential hazards associated with spas and tends to meet all of the criteria, except the decision process criterion, where it fails

completely. With the other criteria, it has weaknesses which examination of the sub-criteria exposes. The chief failure of this kind of policy is its lack of full recognition of the principal uncertainties and a lack of strategy to deal with them. Failure to fully recognize uncertainties involving the nature of pathogenic standards, physical characteristics of spas and spa actor behaviour affects all of the criteria so that this kind of policy is deficient in all areas.

We can consider the development of response to spas by looking at the categories of participants. The chart below depicts most of the actors who are involved in the overall spa management picture. Certainly, there may be others, but these are the main interested groups.

# The U.S. Structure Of Organizational Involvement with Public

## Spas & Hot Tubs

### Federal Agencies

- CDC
- CPSC
- Public Health Joint Committee on Swimming & Bathing
- EPA

### State Agencies

- Various state Public Health Departments
- State Environmental Agencies

### Local

- County Health Departments
- Municipal Health Departments
- Municipal Officials Organizations

### Industry

- NSPI (Wash.)
- NSPI (Local Chapters)
- ISTI (Local & National)
- Individual Firms
- Other Associations (such as ASPI)

### Operators

- High Use Public Facilities
- Low use Public Facilities
- High Use Commercial /Private
- Low Use Commercial /Private

### Code & Approval Organizations

- UL
- IBOC
- IAMPO
- Others

### Not-For-Profit

- Am. Public Health Association
- NSF
- Conf. of State Sanitary Eng.
- Others

### Users

- Social/Recreational
- Therapeutic
- Occasional Users

### Research

- Universities
- Foundations
- Individual Researchers

### Media

- Trade Publications
- Radio, TV
- Newspapers

### The Actors And Their Relation To The System

The key actors in the U.S. spa system are (a) industry, (b) spa operators, (c) spa users, and (d) the various federal, state, and local agencies. Each of these actors have an important role in establishing "safe" conditions of use in public spas through implementation of current knowledge of appropriate spa management and development of improved practices.

Industry has dominated the situation to date. It has been a leading actor in all areas, including (a) provision of information, (b) development of standards, guidelines and regulations, (c) education, and (d) research/studies.

In the development and production of spa products, industry has a strong interest in seeing that spa operating conditions are considered "safe" by the public. Growth and stability of the spa market are highly dependent on the public's perceptions of the recreational/therapeutic benefits of spas weighed against the potential hazards of use. Also, industry's role as the developer and producer of spa products causes other actors to rely upon it for current knowledge and new information about spa management.

Spa operators and users are "the heart" of the spa system. In their respective roles as providers and consumers of spa facilities, they are the most important actors in establishing "safe" conditions and resolving uncertainties. The values and

behaviour of operators and users determine the actual outcomes of spa use conditions and the furthering of knowledge. The roles of operators and users serve both to "test" the efforts of other actors and to greatly influence the performance of the spa management system.

Public health officials serve as intermediaries between industry and operators/users in trying to communicate knowledge and in administering procedures which are considered essential for establishment of "safe" conditions and resolution of uncertainties. In the event that conflict occurs among the other actors with respect to decisions that determine and establish "safe" conditions, public health officials either seek to mediate the conflict or advise elected officials when agreements cannot be reached. Various government jurisdictions in the U.S. allow certain latitude for public health officials to make decisions and act on their own, but health officials remain accountable to elected officials.

The above description summarizes the spa management system structure in the U.S. To evaluate the actual performance of the system, the actions taken by U.S. spa actors are weighed within the framework provided by the criteria of this thesis.

## Analysis of the U.S. Experience

### 1. Governmental Roles and Responsibilities

- a) Have U.S. public health and safety agencies taken positive action to identify conditions (governing standards) which, if followed, provide reasonable assurance that a spa is "safe" to use by most members of the general public and that the health of non-users will be protected?

On a federal level, the CPSC has identified hazardous conditions with regard to drownings from entrapment and hyperthermia. The CDC has developed spa management guidelines, which cover criteria for design, construction, installation and operation of spas, and has also undertaken research on disease outbreaks involving *Pseudomonas* and *Legionella* bacteria. The comprehensiveness of the CDC guidelines and its research program are questionable, though, for the following reasons.

- 1) The guidelines were developed with considerable reliance upon information supplied by industry through NSPI. The information and recommendations supplied by NSPI could possibly be biased or fail to consider all available, reasonable options.
- 2) Because of innumerable other public health concerns and constraints, the CDC has not examined a range of potential spa pathogenic hazards. Research activities are oriented toward examining potential pathogenic hazards after they



occur and are reported -- and only if such outbreaks are considered significant.

- 3) The CDC has not attempted to compile statistics on cases involving disease, illness or deaths associated with spas.

Although positive actions have clearly been taken by federal agencies to identify conditions for "safe use", the adequacy of the steps that have been taken are open to question particularly with regard to pathogenic hazards.

Some original research work has been undertaken by state and local public health agencies (e.g., the state of Oregon's work relating to *Pseudomonas* problems and studies on spa management by Alameda County in California). State and local efforts, however, have been limited and not effectively coordinated among jurisdictions according to reports in the trade journals and statements made by health officials and industry representatives.<sup>1 2 3 4 5</sup>

By primarily using the work of federal agencies (containing strong input from industry), some state, county, and municipal jurisdictions have taken responsibility for establishing spa policies which identify conditions of "safe" use (e.g. California, Oregon, Utah, Dade County in Florida, Seattle-King County in Washington). These jurisdictions appear to have used the CDC guidelines in whole or in part, making modifications as necessary to suit local conditions. Others such as Chicago, have merely transferred swimming pool policies and standards to the area of spas (although such jurisdictions

may be in the process of eliminating use of pool standards for spas and adopting specific spa standards). Some jurisdictions have not attempted to deal with spas at all (e.g. Illinois, Michigan, and Wisconsin). Inconsistencies also exist in overlapping jurisdictions. For instance, the state of Illinois has not taken any action, but subordinate jurisdictions such as Chicago and other municipalities have initiated a process of developing spa standards.

Overall, the U.S. experience indicates a mixed answer to the question of whether public health agencies have taken action to identify conditions of "safe" use.

First, the situation varies among the jurisdictions and levels of government which are examined. Second, conditions for preventing hazards of entrapment and hyperthermia seem to be much more clearly defined than pathogenic hazards (note, see Appendix D: a means for evaluating the efficacy of disinfectants in spas has only recently been developed, indicating the need for additional work). Third, safety measures required of operators and users to meet the specific conditions that relate to spas have not been well developed. Although, conditions governing appropriate user behaviour derived from swimming pool experience (e.g., showering prior to use, not entering spas when individuals have open wounds, etc.) can be readily applied to spas, the special operator management practices required because of the widely varying conditions found in spas have not been well defined and appropriate practices specified.

- b) Have public health and safety agencies taken positive action to identify characteristics of individuals which may require that special precautions be taken to avoid health hazards from spa use?

Much of this type of information, especially related to high temperature effects and increased vulnerability of some individuals to certain diseases, is available within existing medical and public health knowledge. The extent to which this knowledge has been specifically related to spa conditions and spa users again depends on which jurisdiction is examined. Some jurisdictions (e.g. Oregon, Seattle-King County, Arlington Hts., Il.) have identified these concerns, while others have not. Although better information about special precautions might seem desirable overall, jurisdictions which have specifically addressed spa problems can be considered as having taken reasonable positive action.

- c) Have public health and safety agencies established procedures for identifying spas that adhere to standards for "safe" use?

Beyond the identification of design, construction, installation and operation criteria for "safe" spa conditions, the CDC guidelines also recommend procedures for:

- (1) Monitoring public spas.
- (2) Identifying and troubleshooting health and safety problems during the operation of public spas.

As noted above, some jurisdictions have adopted CDC or similar guidelines. Often in these cases, the design, construction and installation criteria are used as a basis for permit or licensing procedures in order to identify a spa adhering to standards. In jurisdictions where these criteria are based upon swimming pool standards, permits or licenses for spa operations are also fairly common. The appropriateness, however, of applying swimming pool standards to spas seems to be strongly deficient in light of recent knowledge. Thus, permits or licenses issued in this context are inadequate as means for allowing individuals to identify a spa that adheres to conditions for "safe" use.

Procedures for identifying spas that adhere to operational standards for "safe" use differ among jurisdictions. Some jurisdictions, using CDC or similar guidelines, have adopted procedures for operator certification. Other jurisdictions simply employ monitoring procedures and identify a spa in violation of standards by closure of the facility until conditions are corrected. Some jurisdictions use both procedures. The jurisdictions using swimming pool standards as a basis for spa operation criteria utilize similar procedures, but again, swimming pool standards are not adequate.

- d) Have public health agencies established procedures that assure members of the public reliable access to information about individual characteristics that require that special precautions be taken, as well as

instructions about how to take such precautions?

The CDC guidelines recommend that warnings be posted to provide this kind of information to individuals. Acceptance of this recommendation varies by jurisdiction in accord with the previous discussion.

However, it may be questionable whether posted warnings are sufficient for assuring reliable access to this information. Signs can be inconspicuously posted or may be insufficient, in themselves, for adequately communicating the characteristics and instructions about special precautions. Seattle-King County is an example of a jurisdiction which has attempted to remedy this possible weakness. The county has made pamphlets, containing important information about special precautions, available to individuals.

Procedures have therefore been established in some jurisdictions, and some jurisdictions have provided more reliable access than others.

- e) Has adequate funding been provided by government for developing information to identify "safe" conditions of use and matters related to special precautions which need to be taken?

To the extent taken toward positive actions, funding has, of course, been provided for the activities described above. However, inadequate funding has restricted development and

provision of information in two ways. First, some jurisdictions (e.g., the state of Illinois) have failed to meet informational needs due to lack of funding and not because of lack of concern about spa hazards. Second, "gaps" of information still exist even in jurisdictions which have been active with spas. These "gaps" (mostly related to pathogenic hazards) can sometimes be attributed to funding problems.

In assessing the U.S. experience for meeting our first criterion, existing policy and practices have been shown deficient within certain jurisdictions and with respect to some of the sub-criteria. These failures may be categorized as follows:

- Jurisdictions which have ignored public spas have failed to assume necessary responsibility for establishing conditions for "safe" use.
- Jurisdictions which have attempted to deal with spas through application of existing public swimming pool standards and policies have not adequately addressed potential hyperthermia and pathogenic hazards peculiar to spas. Thus, users and the general public have not been provided reasonable assurance of "safe" conditions for spas in these jurisdictions.
- The three main uncertainties in spa management (nature of pathogens in the spa environment, physical characteristics of the spa environment, and behaviour of spa actors) create "gaps" of information which have prevented all jurisdictions from completely meeting this criterion.

- Lack of adequate funding has prevented some jurisdictions from entirely meeting this criterion and weakened the ability of other jurisdictions.

## 2. Decision-Making Processes for Establishing Conditions of "Safe" Use

- a) Have alternative government management policies for spas been conceptualized by all affected parties on the basis of information supplied by qualified scientists?

Jurisdictions which have totally ignored public spas can be eliminated from consideration in regard to meeting this criterion. Jurisdictions which have applied swimming pool policies to spas fail to meet the criterion because attention to current technical and scientific knowledge has been neglected.

In federal, state and local decision processes where current knowledge has been utilized, the criterion is not met because all affected parties have not been involved. Industry, public health officials and scientists have been involved, but users, operators, and the general public have not taken part. The assumption behind this process is that public health officials serve as appropriate representatives of users, operators and the general public. This assumption is unjustified, particularly in regard to user and operator representation.

As key actors whose preferences and behaviour are critical

determinants of actual spa management outcomes, users and operators should be more directly represented. Two reasons for more direct user/operator representation are:

- (1) Identification and establishment of procedures for informing individuals about "safe" conditions of use imply value judgements relating to individual preferences for aversion to risks. Since users are the primary spa actors exposed to spa hazards, it is difficult to determine whether our first criterion is effectively met without having significant input from users.
- (2) In presenting necessary information about "safe" conditions and, later, seeking to implement measures designed to assure such conditions, it is important that policy concepts and language are understandable to users and operators.
- (3) Operators can provide practical insight into management practices which can be done effectively.

The lack of user/operator participation in the development of the CDC and other similar guidelines and in a number of public health agency/industry conferences demonstrates the weakness of the current decision-process in relation to the above considerations.

Moreover, industry, by supplying the bulk of information about "safe" conditions, has tended to dominate the decision process. Thus, the ability of public health officials to represent users/operators has been further eroded. In using



guidelines substantially devised by industry without consulting users and operators, the U.S. experience has failed to take into account the preferences and knowledge of two key spa actors.

- b) Do procedures exist through which efforts are made to reconcile differences of preferences with regard to spa management policies?

There appear to be adequate procedures among industry and public health officials for reconciling differences (e.g., conferences, bargaining sessions, use of independent standards-setting groups such as UL). However, as the above discussion indicates, procedures for reconciling differences of preferences are inadequate due to lack of representation of all affected interests.

- c) Do procedures exist for decisions to be made by elected representatives or individuals accountable to them where agreement cannot be reached?

Yes, public health agencies can recommend legislation/ordinances to elected officials, or in some cases they have authority delegated to them by elected officials to make such decisions.

- d) Has funding been established to allow decision processes for establishing "safe" conditions to be undertaken in conformance with all of the above sub-criteria?

There is no clear evidence which indicates whether this

sub-criterion is met. However, it is reasonable, to assume that jurisdictions (e.g. Illinois) without basic spa regulatory funding probably would not meet this sub-criterion.

In brief, the U.S. experience fails to meet the criterion of providing decision-making processes for establishing conditions of "safe" use in which all affected interests have confidence because of the following weaknesses:

- Some jurisdictions have ignored current technical and scientific information about spas so that potential hazards and uncertainties have not been considered -- thus, decisions relating specifically to spas have not been made.
- Those jurisdictions which have paid attention to current technical and scientific information and adopted specific spa policies have failed to allow representation of users, operators and the public. This leaves two questions unanswered which are important to assurance of confidence in the decision process; (1) do users, operators and the public in these jurisdictions agree that these policies, if followed, will produce "safe" conditions (or do these actors simply lack the knowledge necessary to raise issues and express disagreement)? and (2) do users and operators sufficiently understand why these policies are important and how they should be effectively implemented? If these questions cannot be answered affirmatively, there is a logical basis for a lack of confidence in the existing decision process. The nature of the existing uncertainties in spa management, as described in chapter two, tend to

indicate that these questions would be answered negatively.

### 3. Implementation Practices

- a) Have provisions been made to educate operators to understand the functioning of spa systems, the rationale for approved standards, and techniques for adhering to standards (under variable spa conditions)?

Some efforts have been made by both industry and health departments to educate operators. Industry, under the auspices of NSPI and ISTI, have arranged seminars and distributed written materials. Some states (e.g., Oregon) have developed training programs for operators.

Where implemented, educational programs appear to be effective in teaching operators how spa systems function and in teaching the rationales for approved standards. The effectiveness of the techniques being taught for handling variable spa conditions may be questionable though, because experts are still in disagreement about appropriate spa management procedures (e.g., methods for disinfection and intervals for draining spas). Disagreements among experts on these and other important spa management procedures have caused considerable confusion for operators (see Appendix D).

- b) Do procedures exist to inform users about standards and

conditions of "safe" use and to provide simple means for users to check on whether standards are being met?

The CDC guidelines recommend that signs be posted which advise users to avoid use of spas exceeding 104° F and that reasonable time limits (e.g. 10 minutes) should be observed in use. The guidelines also recommend that warnings be posted which advise users of proper behaviour and individual characteristics which require that special precautions be taken. The municipalities of Arlington Hts., Schaumburg, Mt. Prospect, Buffalo Grove, Palatine, and Hoffman Estates in Illinois have adopted these CDC recommendations and require operators to post these warnings. The state of Oregon and the proposed City of Chicago codes simply require that warnings be posted which advise users not to exceed a time limit of 15 minutes. None of the above jurisdictions require or recommend posting of information related to potential visual hazards from poor water clarity, drowning hazards from entrapment, or pathogenic hazards. In these hazard areas, users seem to be seriously uninformed about standards and conditions of "safe" use.

Simple means for users to check on spa conditions seem to be limited to the provision of thermometers for gauging water temperature and wall clocks for gauging duration of spa use. Means for checking other spa water quality parameters (e.g., disinfectant levels, pH, bacterial counts, etc.) are not ordinarily provided in spa facilities or by spa policies.

Procedures for informing users of appropriate spa use

behaviour, as noted above, have been implemented in a number of ways and to varying degrees. However, operator and health official frustrations in gaining user compliance with these behavioural standards have caused this area of concern to become de-emphasized and sometimes totally neglected. As a result, many users are unaware of the importance of checking on the behaviour of other users (see Appendix D).

- c) Do procedures exist for seeing that individuals are informed about characteristics and instructions requiring special precautions be taken in spa use?

There do not appear to be any measures beyond those previously described (signs, pamphlets) which would assure that users are informed in the jurisdictions studied in depth.

- d) Do appropriate government agencies periodically monitor spa operations and administer penalties when standards are violated?

In the jurisdictions focused upon in this study where spas are being regulated, this sub-criterion is being reasonably met. Other U.S. jurisdictions which follow the CDC guidelines would also probably meet this sub-criterion. These jurisdictions check facility records, inspect facilities on a periodic basis, test water samples for parameter levels and bacterial counts, and advise operators on management procedures.

The health departments primarily check disinfectant levels,

pH, and coliform counts (Oregon has also run surveillance on Pseudomonas counts) during on-premise inspections. However, some inspectors may also test the parameters of total alkalinity, turbidity, cyanuric acid, and calcium hardness. As an example of records which operators are required to maintain, the Oregon spa code requires the following:

- a) results of operator tests (as specified by the code) of the parameters listed above
- b) dates and times of filter backwashing (i.e. cleaning)
- c) dates that spas were emptied and/or cleaned
- d) periods of recirculation equipment operation and/or malfunction and repair

However some experts question whether appropriate parameters are being monitored in determining presence of pathogenic organisms and efficacy of disinfectants (testing for Pseudomonas and organic matter are two common suggestions for improved monitoring).

The biggest weakness in the current monitoring system is the reliance upon public health officials' capacities to: (1) check records of facilities, (2) discuss problems with operators, and (3) conduct personal on-premise inspections. As noted by several health officials, time and budgetary constraints severely limit their ability to actively monitor spas as frequently as necessary to see that standards are not violated. CDC's recommendation of once a week is often unrealistic compared to the constraints of many jurisdictions,

and further, the high variability of spas casts doubt upon the effectiveness of once-a-week procedures.

- e) Have provisions for funding of implementation measures been established to provide for current and future spa needs?

As described in Appendix D, Oregon and Illinois state and local officials believe that funding has been generally inadequate because of pressures to restrain or reduce government budgets in the past few years. The costs of implementation measures are significant and these costs usually tend to increase over the long term. In recognizing the variability problems of spas, some officials have questioned the worth of directing major expenditures toward measures such as inspections of spa operations. Outside of public health agency budgets, there does not appear to be any existing schemes to obtain funds from other sources such as industry, operators, or users. The above conclusions cannot be broadly accepted as applicable to all U.S. jurisdictions. However, in view of recent economic conditions it is reasonable to assume, that other jurisdictions, besides Oregon and Illinois, have had similar funding problems.

The third criterion has not been met in the U.S. experience because of the following main weaknesses;

- Variability of spa conditions have made implementation measures both difficult and ineffective.
- Users are poorly informed about standards for "safe"

conditions of use and have little means of checking conditions. Users are over-dependent upon the behaviour of operators and public health officials. In view of the variable nature of spa conditions and its relation to potential hazards, this over-dependence is not sound policy for protecting public health.

- Funding is presently inadequate, and it may always be, in light of the problems of variable conditions. New monitoring/enforcement methods which are less expensive to implement or schemes to secure funding from users, operators, or industry were not found in this study's research of U.S. jurisdictions.

#### 4. Provision for Social Learning

- a) Have public health officials and operators been made keenly aware that reduction of uncertainties and capability to deal with surprises is the most challenging task faced in spa management?

Up until the last few years, the answer was clearly "no". Awareness has started to develop since then, but the number of jurisdictions which fail to regulate spas or treat them similar to swimming pools indicates that awareness is still insufficient (see quotation in Appendix D, p. 208). Operators, as a whole, also appear to be unaware.



- b) Have positive incentives been provided to stimulate spa actors to engage in a concentrated effort to reduce uncertainties?

During this study, a few isolated cases of positive incentives being utilized were found, and it is reasonable to think that others probably exist (see Appendix D, pp. 216-218). However, policies and practices showed no strong evidence of positive incentives being used in a concentrated effort to reduce uncertainties. Failure to acknowledge uncertainties, as noted several times, is one reason for this deficiency. Other reasons may include traditional reliance upon regulatory controls rather than positive incentives, and the lack of a well-organized attempt to deal with spas among the various jurisdictions and spa actors. Because of wide varying degrees of awareness, the need for positive incentives and social learning is not yet fully realized.

The U.S. experience in establishing provisions for social learning shows these weaknesses:

- Recognition of the uncertainties in spa management has developed only recently, and this awareness varies considerably among jurisdictions and from one spa actor to the next. Hence, the need for positive incentives and social learning is not fully realized.
- The notion of involving operators and users in a concentrated effort to reduce uncertainties may be unthought of by other spa actors. Earlier discussion

relating to decision processes for establishing "safe" conditions would tend to support this speculation.

Deficiencies in U.S. Spa Policies and Practices:

Lessons for Design of Model Policy

The deficiencies observed in the U.S. experience can be used as a guide for avoiding similar problems in spa policy for British Columbia. These deficiencies can be summarized as follows:

1. The failure to recognize potential hazards associated with spa use, in some U.S. jurisdictions, has prevented users and the public from being adequately informed about conditions of "safe" use and about requirements for certain individuals to take special precautions in use.
2. Within jurisdictions where potential hazards have been recognized, the failure to allow or encourage adequate representation of the key actors in spa management -- operators and users -- creates serious problems in determining appropriate levels of "safety" and effective implementation measures.
3. The failure to devise appropriate techniques for handling the highly variable conditions of spas hinders the design of effective implementation measures and leaves users overly dependent upon the abilities of operators and health officials to establish "safe" conditions in spas.

4. The failure on a widespread basis to recognize the importance of reducing uncertainties in spa management has retarded or prevented the development of positive incentives and a social learning process in which co-operative and concentrated efforts by operators, users and health officials could improve spa management practices.

### The Canadian Experience With Spas

#### Scope of Study

The study of Canadian spa management system was limited primarily to the Province of British Columbia. The only significant differences between the U.S. and Canadian experience appear to be: (a) fewer numbers of spas and users in Canada, and (b) a later development of the spa market in Canada.

The structure of the spa management system in Canada is depicted in the chart below.

| Industry                                                                                                                                                                                         | Federal Agencies                                                                                                           | Provincial Agencies                                                                                                                                                               | Municipal & Local                                                                                              |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>- Canadian Swimming Pool Assoc.</li> <li>- Individual Firms</li> </ul>                                                                                    | <ul style="list-style-type: none"> <li>- Dept. of Health &amp; Welfare</li> </ul>                                          | <ul style="list-style-type: none"> <li>- Ministry of Health</li> <li>- Provincial Medical Health Officer</li> <li>- Local Health Boards</li> <li>- Union Health Boards</li> </ul> | <ul style="list-style-type: none"> <li>- Municipal Health Depts.</li> <li>- Medical Health Officers</li> </ul> |
| Spa Operators                                                                                                                                                                                    | Spa Users                                                                                                                  | Outside Influences                                                                                                                                                                |                                                                                                                |
| <ul style="list-style-type: none"> <li>- High use public Facilities</li> <li>- Low use public facilities</li> <li>- High use private facilities</li> <li>- Low use private facilities</li> </ul> | <ul style="list-style-type: none"> <li>- Social/Recreational</li> <li>- Therapeutic</li> <li>- Occasional Users</li> </ul> | <ul style="list-style-type: none"> <li>- U.S. Industry</li> <li>- U.S. Research</li> <li>- U.S. Experience</li> </ul>                                                             |                                                                                                                |

Description of The B.C. Public Health System  
and Its Relation to Spas

The federal role with regard to spas and pools is limited largely to educational matters. Policies governing the operation of spas are, therefore, the responsibility of provincial and municipal jurisdictions. Although the organization of institutions is fairly complicated and sometimes overlapping, the institutional structure in British Columbia can be briefly described as follows:

Under the B.C. Health Act of 1972, the Minister of Health and the provincial Medical Health Officer are charged with the responsibility of overseeing the regulations pertaining to swimming pools, spray pools, and wading pools. They may delegate duties to various engineers and inspectors within their respective departments. In practice the Ministry of Health has primary responsibility for issuance of permits, making inspections, and initiating programs related to pools. They also draft legislation, monitor and keep track of the general situation. The Medical Health Officer carries out the lab testing of samples and serves to advise (and also provide joint approval) on matters pertaining to issuance of permits and setting of standards for sanitation, water quality, and public safety.

At the municipal level, a number of municipalities including Vancouver, Burnaby, Richmond, North Vancouver, West Vancouver, and Victoria have their own separate health departments and they also are involved in pool and spa regulation, primarily in monitoring and enforcement roles. Employees of these departments are paid by their respective municipality. Other areas in the province, where separate health departments do not exist, are handled by the provincial Ministry of Health. In areas without separate Medical Health Officers the provincial MHO has responsibility for duties related to pools and spas.

Other institutions also can get involved with pool and spa

policy decisions at the local level. Local Boards of Health have discretion in matters and they can have influence on what the MHO does or says. There are also Union Boards of Health, composed of representatives from municipalities and school boards. They can provide input into decisions for areas outside the jurisdiction of local health departments.

As a general guideline, the legislative domain of the province supercedes municipal and local ordinances. Municipal and local institutions can pass legislation different from the province, but only if the standards are higher. The provincial standards thus serve as the baseline.

#### The British Columbia Experience With Spas

British Columbia has primarily followed the approach of regulating public spas under its existing policy for public swimming pools. With the one exception of maximum temperature requirements, water quality standards are based upon previous pool standards. As indicated in Appendix E, the few provisions in the Health Act which specifically relate to spas are unnecessarily vague and do not provide adequate guidance for operators and users. More significantly, the existing provisions are inaccurate and incomplete in light of current technical and scientific information. Visual, drowning, and hyperthermia hazards are addressed, but only to a minor degree compared to jurisdictions which have actively dealt with spas.

Provisions for public health protection from the special pathogenic hazards posed by spas are completely neglected. Overall, spa policy in B.C. resembles the second kind of policy seen in the U.S. jurisdictions where spas are principally treated as small swimming pools. Since this type of policy has been extensively covered in the evaluation of the U.S. experience, a detailed analysis is unnecessary here. A critique, based upon current technical and scientific knowledge, of existing standards and regulations for spas in B.C. is contained in Appendix E. This critique reviews existing provisions and describes their weaknesses.

It should be evident from the U.S. experience that this approach is seriously deficient. Brief examination of experience elsewhere in Canada substantiates this argument. The Provinces of Saskatchewan and Ontario have experienced growing public health problems with spas and recognized the need to take steps to develop policies specifically aimed at handling the potential hazards associated with spas.<sup>6</sup> The Canadian Swimming Pool Association is in the process of devising specific spa standards.<sup>7</sup> Thus, it seems evident that existing spa policy in B.C. is lagging behind the times, and a new policy should be considered.

### The Case For Spa Policy Change in British Columbia

Using the figures supplied by the province for the number of spas permitted just in the years 1977, 1980, and 1981, we can assume that there are at least 200 public spas operating in the province (figures as supplied in Chapter 1). If we then assume that there are at least an average of 10 people a day who use each spa (not at all unreasonable as there are often 10 people an hour using the UBC spa), then we could conclude that there are a minimum of 2000 people using public spas daily within B.C. Taken over a period of time, even considering multiple exposures by users, a substantial number of people are undoubtedly affected by public spas. In view of the number of people involved and the hazards associated with spa use, it is evident that government action to protect public health is required. Spas are now being extensively used in B.C. and as indicated earlier in this thesis, public health hazards associated with spas require government action to establish and implement conditions of safe use. New policies which accurately account for spa management problems and uncertainties should be developed in B.C. in accord with the evaluative framework established in chapter three and the lessons gained from observation of the U.S. experience.



Footnotes - Chapter 4

<sup>1</sup>Robert Janis, Pool & Spa News, "SPEC Meets on Governmental Affairs", April 5, 1982, p. 16.

<sup>2</sup>Jorian Clair, Pool & Spa News, "Spa Health Code Action Planned: ISTI to Meet with NSF in October", September 21, 1981, p. 98.

<sup>3</sup>Interview with Dave Antonacci, op. cit.

<sup>4</sup>Interview with Jim Brown, October 18, 1982.

<sup>5</sup>Interview with Larry Paulick, Vice President, NSPI, Washington D.C., August 10, 1982.

<sup>6</sup>Letter from L. J. Corkery, Consultant Public Health Inspection, Saskatchewan Health, Regina, Saskatchewan, February 14, 1983.

Letter from Peter J. Block, Senior Consultant Swimming Pools, Public Health Branch, Ontario Ministry of Health, Toronto, Ontario, February 7, 1983.

<sup>7</sup>Ibid.

## Main Sources of Information

### U.S.

Center for Disease Control; Atlanta, Georgia

Consumer Products Safety Commission; Washington, D.C.

State of Illinois, Dept. of Public Health; Springfield, Il.

Cook County Public Health Dept.; Maywood, Il.

DuPage County Health Dept; Wheaton, Il.

Northwest Municipal Conference; Mt. Prospect, Il.

State of Oregon, Public Health Division; Portland, Oregon

National Spa & Pool Institute; Washington, D.C.

National Spa & Pool Institute Midwest Chapter; Chicago, Il.

Great Lakes Biochemical Co., Inc.; Milwaukee, Wis.

Bio-Lab, Inc.; Decatur, Ga.

The Meadow Club; Rolling Meadows, Il.

Chicago Health Club; Maywood, Il.

Contintental Club; Rolling Meadows, Il.

Spa Petite; Schaumberg, Il.

Health Fitness; Westmont, Il.

Pool & Spa News; Los Angeles, Ca.

Swimming Pool Age; Ft. Lauderdale, Fla.

Pool Scope; Washington, D.C.

Chicago Tribune; Chicago, Il.

Canada

B.C. Ministry of Health; Victoria, B.C.

Vancouver Public Health Dept.; Vancouver, B.C.

Vancouver Medical Health Officer; Vancouver, B.C.

Richmond Medical Health Officer; Richmond, B.C.

Burnaby Medical Health Officer; Burnaby, B.C.

Saskatchewan Health; Regina, Saskatchewan

Ontario Ministry of Health; Toronto, Ontario

U.B.C. Aquatic Centre; Vancouver, B.C.

Brentwood Racquet Club; Burnaby, B.C.

Vancouver YMCA; Vancouver, B.C.

Harrison Hot Springs Community Centre; Harrison, B.C.

Vancouver Sun; Vancouver, B.C.

## CHAPTER 5

### Recommendations For a Spa Policy Framework for British Columbia

Since there is not a set of policies in British Columbia which specifically deal with spas in accord with the evaluative framework, a complete set of new policies needs to be designed (with the exception of maximum temperature levels). The following proposed policy framework is designed (a) to meet the evaluative criteria which have been developed, and (b) to deal with the deficiencies found in those jurisdictions which have endeavored to regulate public spas and hot tubs. In the recommended set of policies, no attempt will be made to indicate which particular public health agency should be responsible for the various policies. The term "appropriate health agency" will refer to whatever provincial or local government agencies might be involved in spa management. Further, no attempt is made to judge the extent to which new legislation is required to establish the proposed policies, standards, regulations, or procedures. Specific technical and scientific recommendations are purposefully not included, as this is considered best left to decision-makers and the affected interests within British Columbia. The reader may wish to consult the appendices (especially appendix B) and references cited in this thesis as a guide to technical and scientific concerns. Finally, it is assumed that a minister, committee of ministers, or the legislature, if necessary, will have final responsibility for any policies adopted. The recommendations are as follows:

## 1. Development of Approved Standards and Procedures for Public Spas and Hot Tubs

The Province, under the appropriate health agency, should immediately initiate a process to develop "Approved Standards and Procedures for Public Spas and Hot Tubs in British Columbia", which would separate public spa standards from public swimming pool standards. The most recent scientific and technical knowledge about potential spa hazards and conditions should be utilized to devise standards which provide reasonable assurance for "safe" use. The standards should cover the following aspects:

- a) public spa and hot tub design, construction and installation criteria
- b) public spa and hot tub operation and management criteria, and key parameters (e.g., disinfectant levels, pH, temperature, bacterial counts, etc.) for "safe" spa conditions should be identified.
- c) specific warnings of hazards to spa users and specific information about individual characteristics requiring special precautions during spa use and instructions on how to take such precautions
- d) safety and emergency procedures
- e) appropriate spa user behaviour criteria
- f) record-keeping and monitoring procedures

Standards which cover these aspects serve to meet our sub-criteria of positive action to identify conditions of "safe" use

which will protect users, non-users, and those individuals requiring special precautions. In addition, it would be necessary that the following procedures be established:

- a) Spa facilities should be required to obtain initial operating permits based upon compliance with design, construction, and installation criteria established by the approved standards. Permits should be conspicuously posted.
- b) Spa facilities should be required to periodically renew permits based upon compliance with the operation and management criteria established by the approved standards and other requirements specified by established policy.
- c) Spa facilities should be required to post conspicuous warnings in accord with the approved standards which cover:
  - (i) warnings of potential hazards for the average user.
  - (ii) instructions of appropriate spa use behaviour to prevent occurrence of spa hazards.
  - (iii) individual characteristics which require certain people to take special precautions during spa use.
  - (iv) instructions on how special precautions should be taken.
- d) The appropriate health agency should develop a pamphlet on "Safe Use of Public Spas and Hot Tubs" to be made available to the public through spa facilities and through public health agencies. This pamphlet should include the warnings and instructions described above.

These provisions meet the other two sub-criteria for

establishing procedures which (1) identify spas adhering to standards and (2) assuring reliable access to information regarding special precautions for certain individuals. Thus, development of approved standards within the above format fully meets the first criteria for a "good" spa policy.

## 2. Determination of Provincial Public Spa/Hot Tub Standards and Management Policies

In order that standards and management policies for public spas meet the criterion of having been established through processes in which users, operators, and the public have confidence, the following provisions should be made:

- a) The appropriate health agency should arrange a series of "Public Awareness Seminars" which are open to all interested users, operators, and members of the public. These seminars should serve to illuminate and clarify the basic issues involved in the regulation of public spas.
- b) The appropriate health agency should establish a committee equally composed of representatives from all affected interests (public health officials, members of the public, industry, spa operators, and spa users). This committee should be aided by information supplied by qualified scientists. The purpose of the committee should be to review proposed standards and management policies and to make final recommendations for adoption of standards and policies.
- c) Prior to making final recommendations, the committee should

invite, receive, and review comments about the proposed policy from the general public and special interests by notifying the public of the existence of the proposals and allowing complete access to their content.

- d) The recommendations for standards and management policies should be decided, after weighing arguments and outside comments, by majority vote of the committee. If a minority of the committee has strong objections to the spa policy or to specific provisions of the policy, a minority report outlining the objections and reasons for the objections should also be submitted to the appropriate body with the authority to regulate spas.
- e) The appropriate health agency should authoritatively decide on acceptance of the model policy and issue whatever directives necessary for enacting the policy or delegating authority. If minority objections exist, it should be the responsibility of the appropriate body having the authority to regulate spas to make final determination.

In establishing the above-suggested process for the determination of public spa standards and management policies, the second criterion is fully met by: allowing all affected interests to participate in conceptualizing the policy; providing means for differences in preferences to be reconciled; and providing a means for final determination where agreements cannot be reached.

### 3. Measures for Implementing Spa Standards and Management



### Policies in B.C.

The established spa policy must have effective procedures for implementation. The recommended measures include:

- a) Part VII, section 81 of the B.C. Health Act provides that "Every swimming-pool shall be operated and maintained by a competent operator and manager. The Department of Health may require a certificate of competency obtained through attendance and successful completion of an approved swimming-pool operator's training course as evidence of compliance with this section."

This provision should be activated in regard to spas and therapeutic pools so that all spa operators participate in a provincially-sponsored training program. The training program should incorporate the best current knowledge on the functioning of spa systems, rationales for approved standards, and techniques for operators to deal with variable spa conditions. A sample training program is provided in Appendix F.

- b) Spa owners should be required to formalize the approved standards and management policies into "Plans of Operation". The purpose of this provision is twofold:
  - (1) to encourage operators to consciously think of spa water quality management as a primary goal in the daily, on-going operation of a facility as opposed to viewing compliance with standards and regulations simply as an obligatory task for passing health department inspections.

- (2) to provide users with an additional means to evaluate on a regular basis spa facilities' conditions, services, and performance.

The "Plans of Operation" for any facility should be flexible in allowing an operator to design operating plans according to individual needs, purposes, and creative abilities. However, each plan would have to, in some way, consider and provide for:

- a) satisfaction of the approved standards and procedures
- b) training of facility personnel
- c) notifying users of hazards and proper behaviour (as well as provisions for enforcing this)
- d) water quality and equipment maintenance procedures
- e) monitoring, testing, and record-keeping procedures
- f) safety and emergency procedures

Evaluation and approval of plans should be based on these provisions being met within the limits of current knowledge. Approval for unusual methods would require prior substantiation and be followed through a set trial period of experimentation closely monitored by health officials. Also, anticipated bather load of each facility should be weighed in judging approval. Users and the general public should have access to a facility's plans.

- c) Spa operators should be required to post information, easily observable near the spa unit, about key parameters affecting "safe" conditions. This information should include in simple terms, the following:

- (i) the parameter and a simple definition of the parameter
  - (ii) a simple explanation of what the parameter and possible consequences if the parameter standard is not followed (e.g., "chlorine levels - for disinfection - prevents bacterial growth in the spa").
  - (iii) the range of values for the parameter which adhere to the approved standards
  - (iv) a simple means of displaying the parameter values of actual spa conditions on a continuous or periodic (no greater than hourly) basis.
- c) Spa operators should be advised to take measures which assure that users are informed of special precautions in use and required to provide adequate means of compensation should injuries or deaths occur.
- (i) Spa operators should advise spa users to obtain a physician's approval for spa use, particularly those individuals who have a medical history which would warrant special precautions to be taken. The approval should be updated on a yearly basis.
  - (ii) Spa operators should be required to obtain product liability insurance amounts consistent with the current recommended coverage for similar risk areas.
- e) The appropriate health agency should establish procedures for monitoring and record-keeping to be administered by appropriate agencies. These procedures should include:

- (i) Submittal by spa operators of records of key parameters (recorded periodically, e.g. hourly) and submitted on a weekly basis. These records should be reviewed periodically by the public health agency and the records should be maintained on file.
- (ii) The public health agency should conduct on-site inspections of spa facility premises on a periodic basis to ascertain whether spa facilities are adhering to approved standards and management policies.
- (iii) Public health agencies should establish channels of communication between users and the agency. For example, phone numbers and addresses of appropriate health agencies could be posted in spa facilities and personnel be made available in health agencies to handle phone calls or letters from users and the public. User and non-user complaints, inquiries or problems should be addressed through these channels, and procedures should be developed by agencies to resolve serious or recurring problems.
- (iv) Appropriate health agencies should establish a system of fines and closures as a means to enforce operator compliance with the approved standards and management policies.
- (v) Appropriate health agencies should establish a procedure for arbitration to resolve any problems between users and operators or operators and agencies

which are not clearly defined and resolveable through either application of the approved standards and management policies or the established normal channels of communication. It is envisaged that problems may arise as a result of such factors as; (1) interpretation of approved standards and procedures, (2) changing perceptions of "safe" conditions due to shifts in spa actors' values and behaviour or scientific advances, and (3) issues relating to questions of "fairness". Since policy cannot be expected to fully anticipate such factors in readily codifiable terms, arbitration procedures are important for resolving future problems in specific instances which do not justify overall changes in spa policy. The procedures for arbitration should receive prior approval by the appropriate body having authority to regulate spas.

The above provisions fully meet the third criterion by: (1) providing education and training to operators, (2) providing users with a means for checking actual spa conditions against the approved standards, (3) providing a mechanism which assures that individuals requiring special precautions are informed, (4) providing public health agency monitoring and enforcement procedures, and (5) providing procedures for resolving future problems in specific cases not warranting overall changes in policy.

#### 4. Policies to Reduce Uncertainties and Improve Spa Management and Enforcement Procedures

Because of the existence of significant uncertainties related to: (1) the nature of pathogenic hazards, (2) the physical characteristics of spas, and (3) the behaviour of spa actors, Provincial spa policy should include positive incentives and a process for social learning in order to improve spa management practices beyond its current state. Recommendations of this kind are as follows:

- a) The appropriate health agency with co-operation from scientists and industry should clearly identify the existing uncertainties in spa management; by priority, the uncertainties should be identified in a written report along with suggestions on how these uncertainties might be reduced. The report should be distributed to all public health officials in the Province and spa operators.
- b) "Plans of Operation" should serve to further social learning and improve spa management. Identified uncertainties and problems of top priority could be dealt with through utilization of "Plans of Operation". Operators should be encouraged to include in their plans:
  - (i) actions which might help reduce uncertainties (e.g. data collection of bather use and behaviour)
  - (ii) experimental techniques for handling variable conditions (e.g. methods to determine appropriate intervals for draining spas)
  - (iii) development and implementation of special

recreational and therapeutic programs for users which increase user benefits and which promote user participation in understanding and being responsible for establishment of "safe" conditions. This may improve public health protection and also stimulate operators to compete on levels related to water quality conditions.

- (iv) the use of trained recreational and therapeutic professionals who may bring additional knowledge and perspectives to the "safe" and "beneficial" use of spas.
- c) The appropriate health agency, in conjunction with other public health agencies, should develop positive incentives to encourage operators to improve the level of spa management. Examples of such incentives might include:
- (i) rating systems for spa facilities which are posted or published for public inspection.
  - (ii) presentation of awards for well-managed operations
  - (iii) financial incentives for operators who exceed approved standards or who make an outstanding contribution to elevate spa management knowledge and practices
- d) The appropriate health agency should commission studies and research for reducing uncertainties and improving spa management as funding allows. Studies and research should be conducted by individuals or groups outside of the representative body which recommends or approves standards

(e.g. universities, private consultants). Examples of relevant studies might include:

- (i) the range of pathogenic hazards and preventative measures which can most effectively reduce these hazards
- (ii) methods which operators can utilize to more effectively deal with variable conditions (e.g., appropriate intervals for draining spas, gauging application of disinfectants, etc.)
- (iii) behavioural studies relating to spa management (e.g., how to achieve user compliance with spa use rules, how to effectively teach operators to handle spa management tasks, etc.)

Many other studies that might be worthwhile could be undertaken, but these are the primary areas which should be examined first.

- e) The Provincial Spa Policy should be reviewed by the appropriate health agency at a minimum of every two years (or if significant problems become apparent before then) and adjusted accordingly. The type of decision process, earlier described, which includes input from all affected interests and final authority rested in the legislature should be followed. Communications and meetings with public health jurisdictions outside of B.C., in Canada and the U.S. should be developed in order to exchange information and remain current on spa management policies and practices.



This final set of provisions fully meets the fourth criterion, as they provide for: (a) acknowledgement and identification of spa management uncertainties; (2) a tool (the "plans of operation") for operators to develop a learning process and for improving spa management performance; (3) positive incentives to motivate operator learning; (4) new studies which may reduce uncertainties; and (5) a process for policy review and gathering knowledge from experience elsewhere in order to allow learning within the whole spa management system.

#### Notes on Provisions for Funding

A detailed discussion of funding and other economic matters related to development of a B.C. model spa policy were considered outside the scope of this thesis, and there will not be an attempt to provide detail here. However, the obvious importance of funding to the success of the model policy deserves mention of a few general comments and suggestions, which are based on observations gained through research on this thesis.

First, the economic climate of the past few years has created pressures on all government agencies to restrain or reduce budgets -- public health agencies are no exception. Costs involved in developing and administering programs such as the above spa policy can become substantial. They also generally require on-going expenditures which can often increase

over time. But public health protection is considered one of the primary concerns of government and vital to all individuals in society. Public spas and hot tubs, regardless of one's view toward them, are here to stay; and as matters of public health concern, public budgets should adequately account for spa regulation.

Second, it appears that spa regulatory efforts act as a kind of subsidy for those individuals who use spas, particularly on a regular basis. So far, it also appears that spa regulatory efforts (if undertaken properly) require greater expenditures than with other similar activities, such as public swimming. Further, it appears that spa users, especially regular users, constitute a minority of the population, and hence they can be considered a "special interest". Although it would be unfair to deny any allocation of public funds toward public spa regulation, it is reasonable to raise the question of whether spa users should bear more of the costs involved.

Therefore, the following two suggestions are made:

- (1) Public health agencies should carefully analyze funding requirements for regulating spas both for the short-term and, as nearly as possible, for the long-term. If it appears that budgets will be inadequate, (either now or in the future), to implement spa policy effectively, health officials should alert legislators and the public as soon as possible, rather than wait until problems arise.
- (2) An economic study should be immediately undertaken which

considers alternative methods for obtaining necessary funds for spa regulation. Taxes or special assessments levied on spa users (and applied through operators or industry) should be considered as one of the alternatives. Perhaps a "regulatory tax" could be devised which uses costs of regulation, over and above comparative public health programs, as a basis for computing tax amounts. Such a system might serve the added purpose of providing operators and users with an incentive to manage spa facilities more effectively so as to incur the least needs for government regulation.

Although these comments and suggestions are outside a detailed analysis in this thesis, they reflect experiences, options, and observations derived through work on this case study. These comments and suggestions should at least be considered by policy-makers interested in spas and pursued if deemed worthy of further investigation.

#### Summary and Expected Results: How the Model Policy Can Correct Present Deficiencies

The main weakness in present B.C. spa policy is its failure to incorporate recent technical and scientific knowledge about potential spa hazards and spa management. As a result, potential spa hazards are not being adequately dealt with by policy, and the Province is failing to fulfill its role and responsibility in protecting the health of users and non-users

of spas. Although some jurisdictions elsewhere in Canada and the United States have recognized the potential hazards and taken positive steps to deal with these hazards, their actions should only be partially used as a model for B.C. policy. These jurisdictions have primarily failed to:

- (1) include operators and users in the decision process for developing spa standards and management policies
- (2) sufficiently acknowledge spa management uncertainties and devise a strategy for reducing the uncertainties (problems in handling the variable spa conditions are linked to this matter of uncertainty).

Some jurisdictions in the U.S. and Canada have taken the crucial first step of recognizing the problems associated with spas and attempting to deal with these problems. However, in order for spa management policies to be effective and provide users and the public with confidence that their health is being reasonably protected in the use of spas, additional steps must be taken. It is also crucial that policy-makers recognize that operators and users are key actors and that their active participation in policy development is essential. Further, spa policies must recognize and account for deficiencies in present spa management knowledge resulting from the elements of uncertainty. A change in B.C. spa policy which recognizes potential spa hazards and then takes the additional steps will serve to reasonably protect public health and safety. Recommendations have been presented which correct existing deficiencies by meeting all of the criteria set forth in this

study. If these recommendations are accepted, what results can be expected and how would they actually overcome present deficiencies?

1. Recognition of public health hazards by the Ministry of Health and efforts to develop more appropriate spa standards and management policies will cause all spa actors to realistically examine the potential problems which may arise from public spa and hot tub use. This will allow spa actors to be prepared and to develop preventative measures before serious problems do occur as they have in places with a history of heavy spa market development.
2. The model policy recommendations emphasize communication of necessary information about spa hazards and preventative measures to users, non-users and operators so that spa market mechanisms will be more efficient and lead to "safe" use of public spas and hot tubs. This will serve to fulfill government's responsibility to protect the health of users in spa use and the general public from external effects due to spa use.
3. Inclusion of users, non-users and operators in the decision process for establishing spa standards and management policies will assure, as well as possible, that individual preferences about "safe" spa conditions will be adequately accounted for in spa policy decisions. This not only provides all spa actors with confidence in the decision process, it also will produce a more effective overall spa system by utilizing more fully the capabilities of users,

operators and health officials in implementation of the policy.

4. The proposed implementation measures realistically consider the spa actors' capabilities and the difficulties created by variable spa conditions. Adoption of the recommendations will encourage active participation and interaction among users, operators, and health officials. This will spread the responsibility for establishing "safe" conditions of use and it will enhance the prospect of successful spa management by providing: (a) a means for spa conditions to be monitored and corrected, if necessary, on a more frequent basis which variability requires, and (b) a means for all the various spa actors to check on spa conditions so that hazardous conditions are not ignored because of deliberate or unintentional neglect by any one spa actor.
5. The model policy recommendations acknowledge both the importance of reducing uncertainties in spa management and the need for spa actors to be able to cope with surprises in order to protect public health effectively now and in the future. Positive incentives and social learning tools provided by "plans of operations" and studies are recommended as ways to encourage and allow spa actors to improve spa management beyond its current state. Improved spa management will provide users and the general public with greater confidence that spa recreational and therapeutic benefits can be enjoyed without endangering

public health and safety.

In conclusion, the potential health hazards associated with public spas and hot tubs are very real and they are probably underestimated by many people. Most experts, however, agree that sound spa management policies and practices can significantly reduce the hazards so that public health and safety protection can be reasonably assured to spa users and the general public. Government public policy can effectively serve this objective through the regulation of public spas and hot tubs. Yet, the conditions of uncertainty involved in spa management weaken the ability of government to provide effective control of problems resulting from spa use. Effective spa policies should accept this reality and devise solutions best suited to dealing with uncertainty. Adaptive and flexible spa policies complement the framework for spa management provided by basic regulatory requirements related to the establishment, monitoring, and enforcement of spa standards.

The Province of British Columbia can provide a reasonable level of public health and safety protection in the use of spas which would be consistent with both theory and experience by following the recommendations outlined in this thesis. This necessitates a willingness to change from existing policies and an understanding of how lessons gained elsewhere can be used as a guide for a better system.

Creating a willingness to change public direction is, as noted by Downs<sup>1</sup>, Kaspersons<sup>2</sup>, and others, is often a difficult

task until a crisis occurs. Overcoming this difficulty is the prerequisite for achieving "safer" conditions of use for public spas and hot tubs in B.C. It is hoped that this thesis and similar efforts will create awareness about the problem with public spas, encourage others to take action, and provide direction for taking action.



Footnotes - Chapter 5

<sup>1</sup>Anthony Downs, "Up and Down with Ecology: The Issue-Attention Cycle", The Public Interest 29 (Summer 1972), pp. 38-50.

<sup>2</sup>Roger E. Kasperson, "Environmental Stress and the Municipal Political System", in R. E. Kasperson and J. V. Minghi, eds., The Structure of Political Geography, (Chicago: Aldine Press, 1971), pp. 481-96.

## APPENDIX A

### Pathogenic Hazards and Public Spa/Hot Tub Facilities: New Challenges to Public Health

Robert A. Crandall<sup>1</sup> and C.J.G. MacKenzie, M.D.<sup>2</sup>

Hot-water bathing as a recreational and therapeutic activity has rapidly gained popularity within the last six years. Along with this increased popularity, the incidence of disease associated with spa and hot tub use has also tended to increase. United States officials from both federal and state health agencies (e.g., Centre for Disease Control and Oregon State Public Health Department) have expressed serious concerns about public health problems with public spa and hot tub facilities, particularly where facilities are poorly or only marginally maintained. Numerous cases involving skin infection from the organism Pseudomonas aeruginosa have been well-documented, and studies indicate that there is a higher risk of disease from this organism when individuals are exposed to spas/hot tubs compared to swimming pools.<sup>1-6</sup>

Although P. aeruginosa has long been associated with

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<sup>1</sup>Robert A. Crandall, M.A., Dept. of Community and Regional Planning, University of British Columbia.

<sup>2</sup>C.J.G. MacKenzie, M.D., C.M., D.P.H., FRCP(C), Professor, Dept. of Health Care and Epidemiology, University of British Columbia.

swimming pools, the increased rate of occurrence as a problem with spas and hot tubs raises questions about these new environmental conditions as sources of infectious disease. Comparison of the differing characteristics between pools and spas shows that the spa/hot tub environment is more conducive for the establishment and growth of microorganisms. The warmer temperature range (35°-43°C), pH range (7.0-8.0), aeration, and increased presence of organic materials due to high bather load\*\* are common conditions for spas/hot tubs and all foster a suitable medium for the growth of a variety of potentially pathogenic organisms.

As the experience with P. aeruginosa demonstrates, assumptions underlying swimming pool water quality practices may be misleading when applied to recommending proper design, engineering, sanitation, management, and regulatory methods for spas and hot tubs. Reliance upon swimming pool experience as a precedence for spa water quality may be grossly ineffective, and perhaps in some instances, expose public users to greater risk from pathogenic organisms. The purpose of this paper is to create increased awareness of this possibility, stimulate thought toward more appropriate and comprehensive solutions, and suggest general alternatives for future direction.

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\*\*Defined as "the number of users per volume of water over time."

## Research Background and Methods

This research was motivated by work relating to recommendations for spa and hot tub public policy in British Columbia, whereby concerns were raised about the extent of knowledge relating to pathogenic hazards.<sup>7</sup> Prior personal experience in the pool and spa industry and the previous research cited above also served as a basis for the study.

The spa and hot tub environment was modelled to establish typical operational parameters. A reasonably wide range of microorganisms were selectively chosen on the basis of their potential for survival and/or growth within the spa/hot tub environment. Microbiological data was then obtained by a search of the literature. Using the categories shown in Table 1, characteristics of the various organisms were compared to those of the spa/hot tub model. Additionally, microbiological studies relating to hot springs was briefly examined. An extensive examination of epidemiological studies for infectious disease problems in swimming pools, spas, hot tubs, and other water recreation related areas was also undertaken. Finally, the findings of these investigations were analyzed from the perspective of basic public health and epidemiologic principles.

## Findings

The results are inconclusive due to insufficient data and empirical studies. Although there is a positive correlation between the characteristics of the spa/hot tub environment and

those which favor the growth of a number of potential pathogenic organisms, other important interconnecting factors (efficacy of disinfection, origin and transmission of the organism, and individual susceptibility to infection) which lead to disease outbreaks are not sufficiently known. This complicates the determination of potential hazard. The results from the comparison of the environment and potential pathogens are contained in Table 2.

The review of pertinent epidemiological studies and experimental research raised several questions of particular interest about potential hazards which, to date, have been given little or no public attention. These speculative findings might be worth considering as part of an overall effort to reduce pathogenic risks in correspondence with the environmental conditions.

1. Are the environmental conditions of spas and hot tubs allowing a wider range of pathogenic species and activities to occur?

Besides the more evident factors of temperature and organic matter, spas/hot tub environments may also increase hazards as a result of pH, aeration, and disinfectant efficacy. Research by Brock<sup>8</sup> on thermophilic organisms in hot springs at Yellowstone Park suggests that many of these organisms also have an affinity for alkaline pH and die under acid pH. This pattern is quite consistent with the organisms examined in this study. The slightly alkaline pH range, 7.2-7.8, currently recommended as

the ideal range for spas and hot tubs, is also frequently ideal for the growth of the identified pathogens. Moreover, increased ammonia loads from bather use consistently drive pH in the alkaline direction.

Blanchard and Syzdek<sup>9</sup> describe the role of bubbles in transferring pathogens from water to the air and also in protecting the organisms from disinfection. The aeration process may reduce disinfectant efficacy, but more significantly it introduces opportunities for infection from organisms which are normally transmitted through the air and infect areas of the body not usually immersed in spa water (e.g., nose, mouth, and ears). There may be some trade-off involving the direct effects of aeration upon organisms; on one hand some may be killed, while on the other hand highly aerobic ones flourish.

Rapid build-up of total dissolved solids reduce the efficacy of commonly-used halogenated disinfectants. Ammonias forming with chlorine to produce chloramines further limit disinfection efficacy. Finally, the porosity of spa/hot tub structures (particularly wooden units) allows organisms to attach themselves and develop protective mechanisms against disinfectants. For example, Brown<sup>10</sup> cites evidence of P. aeruginosa forming a protective slime coating as an explanation for the organism's apparent resistance to chlorine under certain conditions.

2. Are current practices sufficient to protect spa/hot tub

users from less likely, but potentially severe or fatal disease?

Two organisms emerge as highly dangerous pathogens capable of withstanding current preventative practices. The first is Legionella pneumophila. The U.S. Center for Disease Control is currently investigating the possible link to spas/hot tubs, after reports from the Vermont Public Health Department etiologically implicated 2 deaths from Legionnaire's Disease with spas.<sup>11</sup> The environmental conditions of spas/hot tubs appear suitable for L. pneumophila. "The relationship between L. pneumophila and algal photosynthesis suggests that warm habitats which are open to algal colonization or algal products may be environments for L. pneumophila."<sup>12</sup> There has been speculation that Pontiac Fever (a non-lethal disease which originates from L. pneumophila and produces influenza-type symptoms) is associated with spas and hot tubs.

Caution is urged in regard to premature implication of spas/hot tubs and L. pneumophila despite acknowledged environmental bacterial presence. L. pneumophila outbreaks have continued despite elimination of the environmental source.<sup>13 14</sup>

One explanation for the epidemiologic uncertainties may be found in work by Rowbotham<sup>15 16</sup> and Nagington and Smith<sup>17</sup>. They suggest that amoeba feed on L. pneumophila and that the legionellas sometimes survive as a result of protection afforded by the amoeba. As stated in a Lancet editorial,<sup>18</sup> "This might possibly be a mechanism by which legionellas could survive in

water, but more importantly it is a way in which large numbers of legionellas could be delivered to a potential host. Inhalation of only one vesicle or an amoeba could let 50-1000 pathogens into the respiratory system, and it would be surprising if there were not more than one amoeba in an aerosol coming from a cooling tower, an evaporative condensor, or a shower." *Limax* amoeba have been routinely isolated from swimming pools,<sup>19</sup> and spa conditions appear more favorable to amoebic growth.

The second organism of interest is *Naeglaeria fowleri*, an amoeba commonly found in soils and water.<sup>20</sup> It has been identified as the cause of fatal meningoencephalitis in over 100 cases from such diverse areas as Czechoslovakia, England, East Africa, Australia, New Zealand, the U.S. (Florida, Texas, Virginia, Georgia, California, and New York), Belgium, and India.<sup>21 22</sup>

Indoor swimming pools, thermal springs, heated pools, and waters used to cool manufacturing processes have been incriminated as sources of the fatal infections. . . . In nature, it feeds primarily on bacteria. Thus, contamination of warm water with bacteria substrate provides an excellent environment for rapid growth. . . . Water in swimming pools should be circulated frequently enough to reduce organic contamination and to control temperature elevation. The value of chlorine has not been demonstrated."<sup>23</sup> \*\*

*N. fowleri* grows readily at body temperature and above, and

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\*\*Anderson & Jamieson (1972) could not eliminate *Naegleria* in a swimming pool using superchlorination up to 10 ppm.



may grow best at  $\pm 45^{\circ}\text{C}$ . Its most favorable pH range is 7.6 to 9.1. Being a highly aerobic organism, the aeration process is also favorable to its survival. Pool filters can provide an excellent medium of growth for N. fowleri and other amoeba.

To date, N. fowleri has not been isolated in a spa/hot tub. The organism is free-living in the environment. *Limax* amoeba have been isolated from human throats and nasal mucosa.<sup>24</sup> <sup>25</sup> Moreover, the organism does form cysts, allowing movement and entry into other environments. At  $37^{\circ}\text{C}$ , N. fowleri are easily transformed into flagellates, facilitating infection through the nasal passages.<sup>26</sup> The possibility of transmission in aerosol form has been mentioned earlier and further, the possibility of an individual submerging his head below water in a spa or hot tub always exists.

The largest reported outbreak of the disease occurred in a Czechoslovakian indoor swimming pool resulting in 16 deaths between 1962 and 1965.<sup>27</sup> Kadlec<sup>28</sup> isolated thirty-three strains of virulent and non-virulent N. fowleri from that same pool 12 years later. The organism would appear to be more hazardous in warm, spa waters. De Jonckheere<sup>29</sup> concludes that warm or thermally polluted waters enhance the growth of the pathogenic strains of N. fowleri. Singh<sup>30</sup> also cites temperature as the dominant factor influencing incidents of fatal meningoencephalitis from N. fowleri in water.

Additional work by Carter,<sup>31</sup> De Jonckheere,<sup>32</sup> Willaert et al.,<sup>33</sup> De Jonckheere,<sup>34</sup> De Jonckheere and van de Voorde,<sup>35</sup>

Kadlec et al.,<sup>36</sup> Lawande et al.,<sup>37</sup> Singh and Das<sup>38</sup> Neva,<sup>39</sup> Chang,<sup>40</sup> and others substantiate the findings presented above.

Finally, Singh<sup>41</sup> states that more cases of N. fowleri have contributed to meningoencephalitis than have been diagnosed and reported. Since meningitis and encephalitis are commonly attributed to bacterial and viral agents, it is conceivable that amoebic sources have been overlooked in diagnosis. Further investigation may be needed to determine the relationship between amoeba and other microorganisms. Groscop and Brent<sup>42</sup> studied the effects of twenty-four strains of chromogenic bacteria on five strains of amoeba (N. gruberi was included, but not N. fowleri). Three of the bacteria, including P. aeruginosa, were found to be toxic to the amoeba. It may also be toxic to N. fowleri. If so, the high occurrence of P. aeruginosa reported in spas and hot tubs could limit N. fowleri. Thus, effective control of P. aeruginosa might enhance the opportunities for establishment of N. fowleri in spas and hot tubs.

3. Are disease outbreaks going undetected because of misdiagnosis or failure of individuals to formally report problems?

Intuitively, it seems quite reasonable that both physicians and patients would have difficulty determining the source of many of the diseases which could potentially derive from spas. These could include: P. aeruginosa (rash symptoms), Pontiac fever (flu-like symptoms), Giardia lamblia (diarrhea),

Trichomonas (vaginitis), E. floccosum (athlete's foot), N. fowleri (headaches and backaches, if not fatal), and Candida Albicans (vulvovaginitis).

Empirical studies conducted in Oregon have shown evidence of undetected and unreported cases.<sup>43</sup> In one study, ninety-three cases of Pseudomonas folliculitis were formally reported in Oregon between 1980 and 1982. An additional 74 cases associated with these outbreaks were discovered by follow-up investigation. Other investigation efforts produced similar information, and in one surveillance program, 75% of affected persons failed to seek medical care. The study also noted several instances of misdiagnosis by physicians and their failure to report cases to the Public Health Department.

#### Summary and Recommendations

The findings presented here do not provide a basis for determining the pathogenic risks of spas and hot tubs, nor do they adequately conclude that the potential hazards constitute significant public health concerns. However, the results do show that spas and hot tubs provide excellent environments for culturing a wide range of pathogenic microorganisms and that the effectiveness of present preventative measures is questionable and uncertain. The potential for hazard is increased by two major weaknesses which often occur in various public facilities; (1) the treatment of units as "small swimming pools" and (2)

poor maintenance and operation.<sup>44</sup> Thus, it would seem wise to direct attention to more appropriate solutions which can reduce risks on a more comprehensive basis - before major problems develop which do provide clearcut evidence of hazards. There are numerous alternatives which may be considered to improve management and regulatory aspects, but they are beyond the scope of this paper. The purpose here is to urge consideration and development of new ideas and devices relating to design/engineering of the systems, water purification, and testing/monitoring.

These general guidelines are recommended:

1. Solutions should be broadly-designed to encompass the wide range of potential pathogenic microorganisms rather than just the most common ones.
2. So far, the singular efforts to correct problems all appear to share the common factor of frequently and strongly disrupting the spa/hot tub environment. Such methods include: frequent draining and thorough cleaning of the unit, frequent and thorough cleaning of the filtration system, and frequent superchlorination or shock treatment of the water. Thus, new solutions might be directed toward constantly de-stabilizing the spa/hot tub environment, thereby placing considerable stress upon possible organisms.
3. The basic principles of epidemiology and public health of host, agent and environment should be used as a guide, and a

minimum of two out of three areas should be sufficiently covered in all situations.

4. Regional considerations should be incorporated into solutions, taking into account social, economic, and resource factors.

Brief examples of alternative technical solutions might include:

- Flow-through water systems coupled with a heat exchanger. This system might be appropriate for water-rich areas such as the Pacific Northwest.
- A heat sterilization process for supply water within the circulation system with a cooling-down process to the desired temperature just prior to re-entry into the spa/hot tub unit. Areas with plentiful supply of energy (perhaps even solar) might consider this approach.
- Combination schemes involving multiple use of disinfectants (e.g., chlorine/bromine and ozone or UV) and improved filtration: Development of devices which monitor organic material levels and automatically shock treat the water when necessary. (Japanese standards for heated baths require permanganate values far less than 25 mg/litre and change of water daily).<sup>45</sup> This approach might apply to areas which are deficient in both water and energy resources.
- Development of devices which sense critical parameters (e.g., organic material, disinfectant free residual, pH,

total dissolved solids) and automatically shut-down the system and prevent re-starting until proper adjustments are made. This could be used in any area.

The above suggestions are not meant to supplant nor ignore the other important social, behavioural, economic, political and legal aspects which surround the situation. However, any technical advances which effectively reduce both hazards and operational costs can be extremely helpful for the confident and enjoyable hot-water bathing. Efforts which directly confront the difficulties of spa water quality management may not only be productive in this instance, but conceivably they could provide valuable information and/or products useful to other areas concerned with water quality.

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**TABLE I**  
**A Comparison of Spa Environment Characteristics**  
**With Characteristics of Selected Pathogens**

| PATHOGENS                     | A   | B   | C   | D   | E   | F   | G   | H   | I    | * |
|-------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|------|---|
| 1. Brucellae                  | NO  | YES | NO  | NO  | YES | NO  | NO  | YES | (I)  | 3 |
| 2. Candida albicans           | NO  | YES | YES | YES | YES | ?   | YES | YES | (DC) | 6 |
| 3. Coxsacki                   | YES | YES | YES | YES | YES | YES | YES | NO  | (I)  | 7 |
| 4. Cryptococcus               | NO  | YES | YES | ?   | YES | ?   | NO  | YES | (DC) | 4 |
| 5. E. coli                    | YES | YES | YES | YES | YES | NO  | YES | YES | (I)  | 7 |
| 6. E. floccosum               | YES | YES | YES | YES | YES | YES | YES | YES | (DC) | 8 |
| 7. Giardia lambali            | YES | YES | YES | YES | NO  | ?   | YES | NO  | (I)  | 5 |
| 8. Gonococcus                 | NO  | YES | YES | YES | YES | NO  | YES | YES | (DC) | 6 |
| 9. Herpes simplex             | NO  | YES | ?   | YES | YES | NO  | YES | YES | (DC) | 5 |
| 10. H. influenzae             | NO  | YES | YES | YES | YES | YES | YES | NO  | (R)  | 6 |
| 11. Legionella<br>pneumophila | YES | YES | YES | YES | YES | NO  | YES | NO  | (R)  | 6 |
| 12. Leptospirosis             | YES | YES | YES | YES | YES | NO  | YES | YES | (I)  | 7 |
| 13. Mycobacterium<br>balnei   | YES | YES | YES | YES | YES | ?   | ?   | YES | (DC) | 6 |
| 14. Naegleria<br>fowleri      | YES | YES | YES | YES | NO  | YES | NO  | NO  | (I)  | 5 |
| 15. Naegleria<br>gruberi      | YES | YES | YES | YES | NO  | YES | NO  | NO  | (I)  | 5 |
| 16. Penumococci               | NO  | YES | YES | YES | YES | YES | YES | NO  | (R)  | 6 |
| 17. Pseudomonas<br>aeruginosa | YES | YES | YES | YES | YES | NO  | YES | YES | (DC) | 7 |
| 18. Salmonella                | YES | YES | YES | YES | YES | NO  | YES | NO  | (I)  | 6 |
| 19. Shigella                  | YES | YES | YES | YES | YES | NO  | YES | YES | (I)  | 7 |
| 20. Staphlococci              | YES | YES | YES | YES | YES | NO  | YES | YES | (DC) | 7 |
| 21. Streptococci              | YES | YES | YES | YES | YES | NO  | YES | YES | (R)  | 7 |
| 22. Trichamonas               | NO  | YES | YES | YES | YES | YES | YES | YES | (DC) | 7 |
| 23. T. tonsurans              | YES | YES | YES | YES | YES | YES | YES | YES | (DC) | 8 |
| 24. Vibrios cholera           | YES | YES | NO  | YES | YES | NO  | YES | NO  | (I)  | 5 |
| 25. Viral hepatitis           | YES | YES | YES | YES | YES | YES | YES | NO  | (R)  | 7 |
| 26. Actinomycetes             | NO  | YES | YES | ?   | YES | ?   | NO  | YES | (I)  | 4 |

\*Total      ©      of      Matched      Characteristics      Sources:  
 9,18,19,23,38,39,46,47,54

- A. Waterborne      B. Can survive aeration  
 C. Survival at spa temperature (35°-43° C)  
 D. Survival at spa pH range (7.2-7.8)  
 E. Survival through spa filtration (Note: effective filtration for various media is: sand 18-20 microns, cartridge 8-10 microns, diatomaceous earth 4-6 microns. Some organisms may be able to survive in the filter units.)  
 F. Survives chlorine or bromine (.225 - 3.0 ppm)  
 G. Transmission between people in spa environment possible  
 H. Capable of infecting parts of body typically immersed in spa  
 I. Typical mode of transmission: (D) Direct contact; (I) Ingestion; (R) Respiratory

TABLE II

Classification of Pathogens by their Established Or  
Potential Hazards in Spa/Hot Tub Environments

## Known &amp; Identified Problems

1. Coxsacki
2. E. coli
3. E. floccosum
4. Mycobacterium balnei
5. Pseudomonas aeruginosa
6. Staphlococci
7. Steptococci

## Known but Rare Problems

1. Leptospirosis
2. Salmonella
3. Shigella
4. Vibrios

## Potential Problems

1. Candida albicans
2. Giardia lambali
3. Legionella pneumophilia
4. Naegleria fowleri
5. Naegleria gruberi
6. Trichomonas
7. T. tonsurans

Potential but Found Commonly  
in other Environments

1. Gonococcus
2. Herpes simplex
3. H. influenzae
4. Pneumococci
5. Viral hepatitis

## Unlikely Problems

1. Actinomycetes
2. Brucellaes
3. Cryptococcus

(Categorization of pathogens based on number of matched characteristics in Table I.) )

TABLE IIICumulative Totals of Matching Characteristics Between  
Spa/Hot Tub Environments and Selected Pathogens

| Spa Environment<br>Characteristics | © of Pathogens With<br>Corresponding<br>Characteristics | % of Pathogens<br>Which May Be<br>Hazardous Under<br>Spa Environment<br>Characteristics |
|------------------------------------|---------------------------------------------------------|-----------------------------------------------------------------------------------------|
| © Found/Total ©                    |                                                         |                                                                                         |
| A. Water                           | 17/26                                                   | 65%                                                                                     |
| B. Aeration                        | 26/26                                                   | 100%                                                                                    |
| C. Temperature                     | 23/26                                                   | 88%                                                                                     |
| D. pH                              | 23/26                                                   | 88%                                                                                     |
| E. Filtration                      | 23/26                                                   | 88%                                                                                     |
| F. Disinfection                    | 9/26                                                    | 35%                                                                                     |
| G. Human Transmission              | 20/26                                                   | 80%                                                                                     |
| H. Region of Infection             | 16/26                                                   | 64%                                                                                     |

Comments

- A. Non-waterborne pathogens, particularly viruses, can be transmitted from one spa user to another.
- E. The amoeba examined are the only pathogens capable of being filtered. However, poor filtration or circulation could allow these organisms to pose a hazard. Also, these organisms may be capable of surviving and growing inside the filter.
- F. A high degree of uncertainty exists as to disinfection efficacy.
- G. Some of the pathogens which are not transmitted from human to human may nonetheless enter the spa environment as cysts.
- H. All of the pathogens can infect the human host in circumstances where individuals submerge their heads under water and where aerosol conditions allow spread of the organisms through the air.

## APPENDIX B

### Current Knowledge & Guidelines for Spa Management

There is disagreement over various spa water quality management procedures, parameters, and acceptable levels. Experts disagree about matters which include (but are not limited to): chlorine or bromine levels, pH values, superchlorination intervals, maximum level of total dissolved solids, and intervals for draining spas and tubs. Progress has been made toward developing uniform standards, but guidelines are still not firm. The chart below is not meant to be comprehensive, but it does provide a comparison of recommendations from several generally recognized sources of expertise. Following the charts, a list of recommended procedures has been compiled and synthesized from the same sources. These procedures apply to public spas and hot tubs.

Sources (in order as they appear on the charts):

- The Center for Disease Control, U.S. Dept. of Health and Human Services
- Jacuzzi Whirlpool Bath, Subsidiary of Kidde, Inc.
- Great Lakes Biochemical Co., Inc.
- Robert Lowry, Vice President and Technical Director, Leisure Time Chemical Corp., member NSPI Chemical Standards Committee

## OPERATIONAL PARAMETERS

## Public Spas &amp; Hot Tubs

|  | MINIMUM | IDEAL | MAXIMUM |
|--|---------|-------|---------|
|--|---------|-------|---------|

## A. DISINFECTANT LEVELS

|                            |                        |                          |                      |
|----------------------------|------------------------|--------------------------|----------------------|
| 1. Free Chlorine (ppm)     | 1.0<br>1.5<br>-<br>-   | 1.0-1.5<br>3.0<br>-<br>- | 3.0<br>5.0<br>-<br>- |
| 2. Combined Chlorine (ppm) | None<br>None<br>-<br>- | None<br>None<br>-<br>-   | 0.2<br>0.2<br>-<br>- |
| 3. Bromine                 | 0.8<br>-<br>1.0<br>-   | 1.5<br>-<br>2.0<br>-     | 3.0<br>-<br>-<br>-   |

## B. CHEMICAL VALUES

|                                      |                          |                                                                       |                              |
|--------------------------------------|--------------------------|-----------------------------------------------------------------------|------------------------------|
| 1. pH                                | 7.2<br>7.2<br>7.2<br>7.2 | 7.5<br>7.2-7.6<br>7.4-7.8<br>7.2-7.8                                  | 7.8<br>7.6<br>7.8<br>7.8     |
| 2. Total Alkalinity (ppm as CaCo )   | 60<br>80<br><br>75<br>-  | 100<br>80-125<br>Plaster, Tile<br>125-150<br>Vinyl, FG<br>-<br>80-140 | 200<br>175<br><br>150<br>-   |
| 3. Dissolved solids (ppm)            | 300<br>-<br>-<br>-       | -<br>-<br>-<br>-                                                      | 1500<br>1500<br>1500<br>1500 |
| 4. Hardness (ppm as CaCo )           | 50<br>175<br>100<br>100  | 125<br>200-275<br>100-400<br>150-400                                  | 500<br>275<br>400<br>400     |
| 5. Trace Metals (ppm) (Iron, Copper) | -<br>-<br>-<br>-         | 0<br>-<br>-<br>-                                                      | -<br>-<br>-<br>.2            |



## C. BIOLOGICAL VALUES

|             |      |                  |                                             |
|-------------|------|------------------|---------------------------------------------|
| 1. Algae    | -    | No visible algae | -                                           |
| 2. Bacteria | None | None             | Refer to local health code or APHA standard |

## D. STABILIZER

|                        |    |   |                                             |
|------------------------|----|---|---------------------------------------------|
| 1. Cyanuric Acid (ppm) | 30 | - | 150, except where 100 by local health dept. |
|                        | 30 | - | 150                                         |
|                        | -  | - | -                                           |
|                        | -  | - | -                                           |

## E. ALGICIDES

|  |   |   |                                              |
|--|---|---|----------------------------------------------|
|  | - | - | Follow directions of EPA registered products |
|--|---|---|----------------------------------------------|

## F. REMEDIAL PRACTICES

|                                                |                                                                                                                                                                                                                                                                                             |                  |                  |
|------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|------------------|
| 1. Daily Shock Treatment Chlorine (ppm)        | 5<br>10<br>-<br>-                                                                                                                                                                                                                                                                           | -<br>-<br>-<br>- | -<br>-<br>-<br>- |
| 2. Additional Superchlorination Chlorine (ppm) | 10<br>-<br>-                                                                                                                                                                                                                                                                                | -<br>-<br>-      | -<br>-<br>-      |
| 3. Water Replacement                           | <p>Water in spas which have high bather use should be replaced continuously or at least once a month.</p> <p>At least once every 30 days.</p> <p>Frequent replacement of 1/4 or 1/2 of water; or completely periodically (1-2 months).</p> <p>Every two months or more often if needed.</p> |                  |                  |

## G. TEMPERATURE

|                |   |                      |                 |
|----------------|---|----------------------|-----------------|
| 1. Temperature | - | Bather<br>preference | 104°F<br>(40°C) |
|                | - | -                    | 104°F           |
|                | - | -                    | 104°F           |
|                | - | -                    | -               |

## H. WATER CLARITY

|                    |   |             |     |
|--------------------|---|-------------|-----|
| 1. Water Turbidity | 0 | 0.5 or less | 1.0 |
| (Jackson Turbidity | 0 | 0-0.5       | 1.0 |
| Units)             | - | -           | -   |
|                    | - | -           | -   |

## PUBLIC SPA/HOT TUB OPERATOR'S GUIDELINES

---

Initial Start-Up or Refill

---

1. Clean & polish spa.
  2. Pre-filter water during fill; do not use deionized or softened water.
  3. Add sequestering and chelating chemicals.
  4. Test and balance water for pH, total alkalinity and hardness.
  5. Add sanitizer and begin circulation.
  6. Shock treat.
  7. Turn on aeration pump or blower.
  8. Start up chemical feed pump & begin adding sanitizer continuously.
  9. Turn off aeration and use only as needed, but run circulation system 24 hours/day.
- 

---

Check Hourly

---

- |                          |                                      |
|--------------------------|--------------------------------------|
| 1. Chlorine (or Bromine) | - Maintain 1-3 ppm residual.         |
| 2. pH                    | - Maintain 7.2-7.8                   |
| 3. Temperature           | - Maintain at 104°F (40°F) or below. |
- 

---

Daily

---

1. Shock treat to 10 ppm.
  2. Test and correct if necessary total alkalinity, turbidity.
- 

---

Weekly

---

1. Test and adjust hardness, cyanuric acid (if applicable)
  2. Clean filters or filter elements
- 

---

Monthly

---

1. Drain, clean and refill unit.

---

## Periodically

---

1. Add sequestering and chelating chemicals.
  2. Add defoaming agent as necessary.
  3. Clean areas adjacent to spa/hot tub.
  4. Check and maintain support equipment.
  5. Add make-up supply water as necessary.
- 

## Additional Procedures

---

1. Provide training to all employees actively involved in spa management with regard to equipment, chemical handling, water treatment, and safety & emergency procedures.
2. Provide accessibility to instructional materials, first aid equipment, and safety & emergency procedures.
3. Maintain records on daily basis for:
  - Amounts of chemicals added.
  - Amounts of fresh water added.
  - Results of all water tests.
  - Date and time of filter backwash or cleaning.
  - Periods of recirculation equipment operation and/or malfunction and repair.
4. Enforce the following rules and post a caution sign.
  - No person shall use the spa alone
  - Children under 14 shall not use unless a responsible observer is present.
  - Bathers shall take a cleansing shower.
  - Swimwear shall be clean.
  - No person suffering from a communicable disease transmissible via water or under the influence of alcohol or drugs shall use the spa.
  - No person shall engage in horseplay in or around a public spa.
  - Persons using medications such as anticoagulents, antihistamines, vasoconstrictors, vasodilators, stimulants, hypnotics, narcotics, or tranquilizers shall use the spa.
  - Elderly persons, pregnant women, and those suffering from heart disease, diabetes, or high blood pressure should consult their physician before using the spa.
  - Observe a reasonable time period (e.g., 10 minutes). Shower, cool down, and if you wish, return for another brief stay. If feelings of dizziness, nausea, or faintness occur, leave spa immediately.
  - Do not use spa at temperatures above 104°F.

The above guidelines are merely intended to represent a cross-section of spa management recommendations, and they are not necessarily authoritative or irrefutable. However, they do represent the current state-of-the-art knowledge as well as demonstrating some of the discrepancies. It should be noted that these guidelines have changed over the past few years, evolving from swimming pool standards which were determined inappropriate for spas. Finally, the parameters and guidelines represent a collection of work and they are often duplications of recommendations from other sources.

## APPENDIX C

### Behavioural Characterizations for Spa Operators, Spa Users, Health Officials and Industry Representatives

#### Spa Operators

It is useful to categorize the types of spa operators commonly found managing spas, bearing in mind that any generalization is never complete, fully accurate, or without exception.

##### 1. The Fastidious Operator

This type of person takes a great deal of pride in both the conditions of the spa and his own ability and knowledge of the operations. Compliments, public approval, and general recognition are highly motivating factors as well as the individual's own personal pride. Usually this type of person is an eager learner and tries to keep abreast of new developments and information. Although financial incentives and/or threat of punitive action may have influence upon this type of individual, the dominant factor remains in the realm of self-pride and outside approval.

##### 2. The "Know-It-All" Operator

The "Know-It-All" characteristically assumes that he has all the answers; what he does is always correct; and things must be done his way or not at all. This is probably the most difficult person to deal with, because he will defy regulatory

efforts (overtly and covertly), disregard economic incentives to prove a point (even at his own expense), and place little significance on pride and approval factors (for the reason that he assumes an initial level of expertise and needs no further reinforcement). Occasionally, this kind of individual will be deceptive by pretending to listen to advice and suggestions or to weigh alternatives, but then in practice, he will proceed in his own direction anyhow. In rare instances, logic and common sense work to motivate this individual, but most often the best approach is to apply chosen motivation techniques in such a way as to allow for expected discrepant behaviour.

### 3. The Greedy Operator

This operator adheres quite closely to the principles of profit maximization. The "bottom line" strongly determines his decisions and actions, both in positive and negative directions. He exhibits no special biases toward maintaining spa water quality or public safety and health. He is as likely to show strong concern for these matters as to show weak concern, depending on his conviction and analysis of what is financially best for him. To a large degree, this type of person is fairly easy to deal with because his motivations are clear and direct. Sometimes regulations which threaten to impose costs can modify his behaviour, but often this type of person quickly learns ways to work around the regulations or to exert influence to his advantage. Economic incentives work best because they make the most sense to his framework of understanding the world.

#### 4. The Fearful or Security-Seeking Operator

This type of person will do whatever he deems to be the best overall course of direction to protect his facility, his job, his reputation, and similar concerns of others directly related to his pursuits. Although each of the categories share this characteristic to some degree and in various forms, the "fearful or security-seeking" operator is distinguished by his inordinate attention to obtaining and maintaining security for the sake of security itself. As a result, his handling of any particular phase of the operation is never predictable, because this individual is continuously engaged in making trade-offs amongst his various concerns regarding security, for which he tends to conceal his intent and purpose. Combinations of motivations work well with him, but generally positive reinforcement and encouragement of latitude and expression are best, so long as there exists provisions for controlling excessive and extreme behaviour which might be highly advantageous to his sense of security, but jeopardize others.

#### 5. The "Easy-Going Operator

This last kind of individual, because of financial well-being, maturity, or other self secure traits, almost always is indifferent to the types of policies and requirements involved in operating the spa so long as they are reasonably fair and consistent. This operator is primarily concerned with avoiding needless hassles and entanglements, and often he is most concerned with "playing by the rules", having things run



smoothly, and doing what is "right" for all parties concerned. This type of person is by far the easiest to deal with because of his flexibility, open-mindedness, sense of fairness, and willingness to cooperate. However, if policies or requirements are implemented which greatly take advantage of those attributes, such a person can become a very difficult and formidable opponent to any process.

In summary, these categories of operators certainly cannot be considered either comprehensive or singularly true for each spa operator. Certainly it is possible to construct other characterizations or variations of ones above. And undoubtedly, each spa operator possesses portions of more than one of the characteristics. However, these categories do represent the most common characterizations and cover a significantly wide range of probable behaviour in spa operations. The most important consideration is to identify these possible characteristics, evaluate the key motivating factors, and assess the relative extent of each type of behaviour within the spectrum of spa operators as a whole in order to develop some reasonable idea of what incentives and/or disincentives will be most effective and efficient in different situations. There are obviously no patent answers, but consideration of these behavioural characteristics, along with careful thought, judgement, and experience are necessary.

Although the behaviour of spa operators is key to sound spa management in B.C., it is helpful to characterize the other

actors who are participants in the situation. In order to familiarize the reader with various ranges of personalities, the following brief descriptions are provided.

### Spa Users

#### The Uninformed User

This covers the vast majority of current spa users. They assume either that there is no danger or that the danger is remote. They assume, for instance, that "all those chemicals being poured into spas" automatically protect them from infectious disease. Instead, they worry misleadingly about contracting diseases popularized by the media, such as Herpes. The biggest fallacies which uninformed users are prone to believe are that scientists really know the answers to "safe" spa management and that public health officials are conscientiously and consistently safeguarding the public welfare. An uninformed spa user becomes informed through exposure to both additional information and experience.

#### The Careless User

A spa user can be informed about spa risks and have a desire to avoid them, but some users will still be careless in their use. Individuals, either through preoccupation with other things or by simply failing to stop and think, can easily neglect to shower before use or proceed to enter a spa with an

open wound. Reminders of some sort, particularly ones which careless users cannot avoid noticing or obeying, are the best means for insuring more careful use.

Another class of users will tend to ignore warnings which they feel are unnecessarily protective. These type of people may think that precautionary warnings and measures are wise for most people, but that they are exaggerated for them. Because of the misperception that they are somehow beyond being affected by hazards posed to the "average person", it is necessary to present the dangers to them in an immediate context and to challenge their assumptions by straightforward logic.

#### The Risk-Taker

Individuals do exist who maintain a fascination with facing risky, and even outright dangerous, situations. They may be well aware that heavy alcohol consumption or smoking marijuana immediately prior to using a spa has a high element of risk. Yet, this kind of person finds a sense of excitement or a "thrill in living" by acting close to the border of injury or death. One method for dealing with this behaviour is simply to prohibit these types of users or certain behaviours of these users. Another alternative method, where feasible, is to develop some way to remove or dilute the perception of danger for this individual.

#### The "Picky" User

Some spa users will find fault with spa operations or

public health efforts no matter what attempts are made with spa management. This individual would be unhappy even if policy followed his own recommendations. This kind of behaviour is really a form of seeking attention. Since a "picky" user wants attention and to have his views expressed, it is worthwhile to involve him as a participant, but not at the expense of excluding or detracting from the interests of other people. Policy should clearly and unequivocally force the "picky" user to realize that his is not the only interest which must be satisfied.

#### The "Willy-Nilly" User

This is a very difficult type of user to deal with, because fears are generally irrational and unrelated to the actual spa operation. It is not likely that operators will regularly encounter situations of use by these people, due to their obvious presence of fear. However, it is conceivable that for medical reasons or peer pressures to engage in spa use that a "willy-nilly" user may be a concern. The only effective way to deal with this potential behaviour is to recognize that such people exist and to provide special circumstances, arranged by trained personnel, to work with this user. This probably will be a rare situation, but one which should be anticipated.

#### The Informed and Intelligent User

At first glance, the behavioural characteristics of this user might appear "ideal" for spa management. However, an

informed and intelligent approach by such a user may only be wise for that person's own selfish interests -- it implies nothing of his views toward imposing hazards or costs on others. In certain cases, an "intelligent" decision for one person may even involve raising risks for other users. For example, it is not inconceivable that in a crowded facility an individual might deliberately appear at "spa side" with an ugly body rash or evidence of illness in order to create more room in the spa for himself.

Furthermore, this type of user can still be lulled into ignoring the real uncertainties associated with spas. Policy should consider means both in accounting for "third-party" effects and in acknowledging the real uncertainties in dealing with this type of user.

### Public Health Officials

#### The Strict Enforcer

Some officials will demonstrate an "engineering perspective" in which spa management is viewed as a formula of standards or guidelines which can be readily evaluated and then corrected through some enforcement provision. Rigid positions may be taken which stir animosity within operators toward health officials and regulations, and this can produce outward or covert operator defiance, resulting in increased risks to users. Rigid positions can also cause officials to overlook the

weaknesses of recommended spa management and ignore new and better ideas. This is particularly applicable in our situation of high uncertainty and variability.

To allow for this form of behaviour, policy should seek to motivate these officials by emphasizing spa management objectives, which lead to success in overall goals of risk reduction; and not focus too narrowly on success merely with methods of spa management. Further, policy should not encourage such officials into entrenched positions where judgements of their performance are based upon success in enforcing methods rather than success in risk reduction. (e.g., it would be more preferable to evaluate the officials' performance based upon reduction of disease outbreaks rather than upon the number of facility closings from failure of operators to meet standards.)

### The Zealot

This official has the tendency to find dangers lurking everywhere within spa environments and develop a cause to "root out all the evils". The zealot may direct attention at spas generally or at operators and users. This individual will demonstrably (and sometimes blindly) pursue avenues of criticism and actions designed to correct what he views as serious problems. This behaviour can sometimes be helpful, but it can also be short-sighted. Moreover, it may take a destructive form which polarizes other participants and creates stalemate situations in important areas for resolving spa management problems.

Officials of this type can perhaps best be motivated in more positive directions by exposing them to other participants' questioning. Similar to the rigid positions associated with the "strict enforcer", behaviour can also be largely modified through developing more flexible and clear policy objectives.

#### The Clockwatcher

He has a job to do. And that job is largely defined in terms of maintaining a physical presence during specified time periods. Although this person may carry a semblance of professional responsibility during work hours, this sense does not guide his actions. Anything in his role as a public health official which appears to extend beyond his "job description" will be ignored or done superficially. This kind of official is also prone to becoming a "buddy" of spa operators and to allow unreasonable leeway in regulatory enforcement.

#### The "I'm too busy for that now" Official

This is a relatively common type of public health official with respect to public spas. Besieged (or perceived as being besieged) by numerous public health concerns and projects, this officials sees spas as a nuisance and tries to avoid having to deal with them. He rationalizes spa problems as being minor and he will procrastinate on taking action until pressures for doing so mount.

The individual is motivated partially by education about the problems, but public or legislative pressures are necessary

to really stimulate this official.

### The Guardian or Steward of Public Health

An official of this type truly does try to protect the public interest. While being concerned about reducing risks in spa management he is also well aware of the co-operation needed from operators, users and industry to obtain successful results. This individual will hold firm to maintaining sound public health principles, but he can also carefully weigh economic and behavioural factors into spa management policies. Thus, this official often is highly effective in policy implementation. Policy can greatly benefit by promoting these types of officials into leadership roles.

### Industry

#### Order-Takers

An industry order-taker merely attempts to meet the requests and demands of operators and consumers without ever questioning the products being purchased or their intended use. The underlying attitude is that their job is merely to provide the services or goods and their responsibility ends at that point. Unfortunately, the nature of spas makes this behaviour undesirable. Through ignorance or attempts to cut purchasing costs, operators may use spa products which jeopardize the safety of users.



Order-takers can be dealt with by making them sufficiently aware of their after-sale responsibilities. They are also motivated to assume more responsibility whenever competition forces comparison of product quality as a factor in operator and spa user buying decisions.

### Evangelists

Certain members in the spa industry attempt to increase their revenues or status through organizing committees and campaigns to develop good spa management guidelines. This type of person will frequently appear on codes and standards committees. His motive is usually selfish, which, in some cases, will serve the public interest via the "invisible hand" principle. However, when the behaviour of this individual becomes fixed in a pattern of "evangelism", the rigid features described with certain health officials become applicable here. Options become overlooked and the larger picture of spa management objectives can be lost. Policy should consider approaches for dealing with industry "evangelists" in much the same way as zealous public health officials.

### Gypsies

There is an industry joke about people who buy a truck, paint their name on backwards, and suddenly call themselves "qualified pool and spa service people". The sad truth is that such characters do in fact exist -- and sometimes in large numbers. They can go in and out of business as quickly as a it

takes them to finish a particular job and get paid. Their lack of knowledge of their trade and underlying lack of concern for their customers can lead to haphazard work, sales of unnecessary or dangerous products, bad advice to operators, and angry customers who then distrust industry members in general.

Licensing and certification requirements can perhaps eliminate "gypsies" or force them to "clean up their act". More effectively, customers with better information about these characters and other alternative services may decrease the effects of "gypsies" upon spa operations.

### Sharks

These people have the same effects upon spa management and operations as "gypsies", except that "sharks" intentionally and knowingly pursue selfish interests without concern for their customers or the public. There is no real element of conscience in their actions and the old expression "they would sell their grandmother to cut a deal" aptly applies to the behaviour of these industry types.

Although their effects on spa management are akin to those of gypsies, the "sharks'" motivation of excessive greed presents a different challenge to policy. Consumer information is helpful in controlling the behaviour of these industry types, but it is also necessary to have provisions which provide consumer protection and means for recourse.

### Technicians and Engineers

This group of people in the industry usually operates "behind the scenes" yet they can have a powerful influence on products, services, and information developed by the industry. Technicians and engineers not only produce technical solutions to spa management problems, but they also can help clarify and analyze situations for other industry people.

However, technicians and engineers tend to exhibit little understanding of the abilities and willingness of operators and users to comprehend spa management. This attitude can lead to design of products and output of information which confuse operators and users or which does not match the reality of spa management situations. It is important that these kinds of individuals are exposed to a wide range of other people as well as to what might be considered "irrational behaviour" of operators and users. Seminar presentations to operators or users and in-field consulting are excellent vehicles for enlarging the perspective of the technicians and engineers.

### Honest Businessmen

The use of the word "honest" with this category of industry people does not necessarily refer to moral qualities; but rather it refers to a behaviour consistent with solid business principles. Honest businessmen live up to their stated commitments in transactions. In their belief in the maxim "it's good for business", they will be facilitating with customers beyond what normally might be expected. The behaviour of honest

businessmen is motivated by their attitude that life functions best on a reciprocal basis. These industry people usually make strong contributions to spa management problems, as they are aware that safe, happy operators and users will produce future profits. Honest businessmen are generally quite easy to deal with, but it cannot be automatically assumed that these individuals will be aware of situations where reciprocity is important. It is necessary for others to draw attention to problems.

### Marketers

Such individuals are a version of honest businessmen, with an important difference. Marketers have a larger and longer-term perspective and concentrate on concepts rather than just specific transactions.

Their behaviour can be invaluable to spa management, as these individuals will take initiative to find solutions. Frequently, the most creative and innovative ideas will emerge from this group of people. Policy can particularly benefit by utilizing marketers' talents toward restructuring potentially negative situations into positive directions.

The above descriptions conclude an overview of the behaviour which can be expected from the other main actors involved with spa management. As with the characterization of spa operators, no claim of total accuracy or comprehensiveness is made. However, if policy-makers are alert to the potential for other possible behaviour, it is reasonable to use these

characterizations as a foundation for behavioural assumptions.

## APPENDIX D

### A Detailed Description of the U.S. Experience

As a guide to understanding the roles of each participant, it is helpful to clarify the categories and indicate some of their important contributions to spa management progress thus far.

#### The Industry's Role

The spa industry originated from the pool industry, later splintered off on its own, and more recently, the two groups moved closer together. The earlier fracture of the two sectors was a direct result of differing needs and interests as seen by the people whose business was predominantly spas. This splintering was highly significant because it forced the pool industry into recognizing and accommodating the differences; thus adding impetus to the spread of information about spa characteristics. By the term "industry", we refer to the business firms which are engaged in the manufacturing, distribution, retailing, and servicing of spa and spa-related products. These firms represent a very wide scope of organizational types in size and structure.

The trade association groups have been classified here despite their not-for-profit status and stated public-interest objectives. The National Spa & Pool Institute (formerly the National Swimming Pool Institute), located in Washington, D.C.,

is the dominant trade association, and as a trade association, it is unique. It is a completely vertically integrated international association of more than 2000 member firms in the U.S., Canada, and over 20 other foreign countries. The association represents firms which range from giant corporations to "ma & pa operations". It includes diverse members such as independent sales representatives, consultants, public health officials, architects, financial institutions, and others. In spite of its relatively small size as a trade association, NSPI is very effective and active, particularly in technical and government relations efforts. It is highly regarded with respect to its effectiveness and activity. What makes the association unique is its dual status as both a public service organization and as an arm of the industry. In regard to its public service role, the NSPI charter lists one of its objectives as; "to dignify and elevate the standards of the swimming pool and spa industry; to conduct a program of public education with respect to swimming pools and spas; and to establish uniform standards for the design, construction, and equipping of swimming pools and spas." In this function the NSPI works closely with appropriate government agencies, universities, code associations, and other public service agencies such as the American Red Cross and the National Sanitation Foundation. With these groups, NSPI shares information and services reciprocally, conducts research, and develops programs.

On the other hand, the association also clearly represents "industry" interests. It specifically develops and implements

promotional and marketing programs designed to stimulate consumer demand and influence public preferences and opinions. Its annual convention, though partly educational, serves primarily as a showcase for manufacturers' products.

The importance of this background information to this study is two-fold. First, NSPI has substantial influence on the policy process nationally and locally. Secondly, its dual function raises questions regarding conflicts of interest. For example, in 1979 NSPI received a \$9,000 contract from the Center for Disease Control for work relating to the development of spa management guidelines (referred to several times in this study) and the CDC openly acknowledges NSPI as a major contributor to the guidelines. This has both value and factual ramifications. First, as a matter of controversy, not established fact, some people have charged that NSPI is dominated by the large manufacturing firms whose dues and other contributions also represent the largest source of revenue to the association. If this is true, then the possibility exists that these manufacturers may influence public policy to their benefit. There is, in fact, a Manufacturers' Council, which does provide some evidence of this. As an example of this, the Council recently acted to try and prevent the National Sanitation Foundation (NSF) from making changes to the present pool filtration standard and adding requirements for spa equipment testing and listing.<sup>1</sup> The bargaining is not concluded, but it looks as if a compromise will be reached whereby the standard will be modified rather than having a new code written for



spas.<sup>2</sup> The significance of possible manufacturer control is that these firms have a stake in selling specific products; whereas other types of firms (i.e., wholesalers and retailers) do not -- their interest is to sell any products. This distinction can possibly be both beneficial and detrimental for the public interest. A manufacturer (or group of manufacturers) may influence public policy toward acceptance of undesirable or unnecessary products. Conversely, they may have a beneficial effect at times by being more discernable and knowledgeable about products. Regardless of the actual amount of influence of manufacturers, though, it is reasonable to suggest that close NSPI involvement in public policy formation is to some degree biased toward industry interests, possibly at the expense of others.

A second ramification is that (as in many organizations) important policies can often be dominated by the same individuals or companies, time after time. From a standpoint of factual concerns, this creates the possibility of good information or alternatives being overlooked, accidentally or otherwise. Also, there is frequent duplication of recommendations in guidelines and standards. The danger of this is that separately published materials can be deceptively accepted as having gone through a process of separate investigation, questioning, and analysis. Thus, aside from normal value questions, the dominance of the same groups can also lead to a tendency to ignore important outside actions or empirical knowledge.

Against these criticisms about potential NSPI conflict, other considerations must be weighed. First of all, NSPI has, in actuality, accomplished its dual role quite successfully and retained an acceptable level of credibility and objectivity in the minds of many people. All of the other sectors shown in the chart do recognize (to varying, but significant degrees) NSPI as a legitimate public service organization. There are reasons for this: (1) in order to remain "legitimate" in the eyes of government, other organizations, and the public, NSPI must always consciously endeavour to strive for fairness, objectivity, and the public interest. It would be suicidal for NSPI to do otherwise and perhaps at times the association may have to act contrary to its own interests in order to "prove" its posture; (2) the large diversity of members in the association almost inevitably guarantees that no one specific interest can dominate, i.e., unfair or unreasonable actions in one direction can negatively affect others and provoke serious disputes. As an example, a chlorine manufacturer who tries to influence standards toward acceptance of chlorine as the "proper" spa disinfectant will surely draw the wrath of the bromine (or other disinfectant) manufacturers. This acts as an effective check against abuses, but ironically, it can also be detrimental to factual concerns. Certain products, which may be inferior, could be tolerated in standards as an effort to appease those interests. (3) NSPI is consistently the target for criticism by the trade publications, disaffected NSPI members, and non-NSPI industry people. As to be expected, criticism

usually aims at exploiting whatever appears to be biased, improper, or done in poor judgement. In its goal to increase and retain membership, NSPI must always constantly be alert to that potential criticism and try to avoid it by seeking objectivity. This, too, forms an effective check against abuses.

A second consideration is the postulation of what the overall situation for pools and spas would be without NSPI. Many of its recognized contributions might not otherwise occur, and it is unlikely that government or other organizations would have the wherewithal and/or the interest in acting as a substitute for NSPI functions. Moreover, individual firms would have little reason to restrain their selfish and potentially destructive efforts, as the checks against this would be non-existent. This consideration is an exceedingly important justification for NSPI's role.

A final consideration is whether it truly matters if a conflict of interest exists or not. Studies of other industries indicate that industry often "captures" the regulatory process anyhow.<sup>3</sup> If this is true and we are unable to devise better systems in general, then what difference does it make whether the industry influence is exerted in an organized or unorganized manner? Some might argue that when influence is exerted through an association, at least it is done in an orderly, organized way, whereby decisions and actions can be more readily identified and traced if questionable situations arise.

In summary, NSPI, both on a national and local level, has

the potential for demonstrating conflicts of interest which affect public policy and may be counter to the public interest. However, experience shows that this is largely not the case and that where possible abuses may occur, those abuses are perhaps more tolerable than the alternative of not having the association. The question then might be raised; why doesn't the NSPI simply discard the role of being the arm of the industry and solely concentrate on public service matters? The question has been raised and within the industry itself. The answer is quite basic -- it really does not matter if the association does pursue promotional and marketing activities. For in order to obtain the funding, information, and cooperation of the various firms, NSPI would still be subject to potential bias and lack of objectivity -- that aspect would not change. If promotional and marketing activities offer motivations for firms to join and support the association, then so be it. The benefits from this support and self-induced checks against business abuses far outweigh the possible negative effects which would be beyond any ones present in a purely public service role.

This lengthy discussion of NSPI is more pertinent than for the other actors involved, because it is the focal point for the U.S. experience with spas. Of all the actors, it is the one which has had the most direct interaction with every other group. As a result, it serves as a "weathervane" for what is taking place on a regular basis and also as a culmination point for what has taken place through the efforts of others.

Federal, State, and Local Government Agencies

These actors have been lumped together for convenience, but their roles in the U.S. experience have been quite varied both with regard to different responses from each level of government and within each level itself. There have been some very active and vocal public officials who have urged and taken public action with spas. But there are also a large number of officials who have not wanted to take steps or could not. The reasons for this are interesting.

In-field interviews revealed that there are officials who prefer to avoid involvement with spas. This runs contrary to possible stereotypes of public health officials such as "they are always dedicated to protecting public health" or somewhat opposite, "public agencies will jump at any opportunity to stick their nose into a situation and attempt to garner positions of authority or power". The reluctance is, as previously mentioned, due to both lack of knowledge and lack of concern, but it goes deeper and is quite understandable. Public health officials have innumerable existing and potential health concerns, all of which could conceivably place high demands on their departments' manpower, budgets, and time. Some feel that they already are not satisfactorily coping with present responsibilities, so that the prospect of new ones are not desirable. This attitude has been exacerbated by the recent rash of government cut-backs. It is a situation of being asked to do more with less. Thus, if it is at all possible to avoid the added administration costs and

problems of spas, some public officials would just as soon "look the other way".

Some departments simply cannot afford to do what they view as necessary. The combination of rising costs and shrinking budgets has constrained public activity in some jurisdictions. The state of Illinois is one example. With their normal pool program, the department has been forced to eliminate sampling, lab tests, and reduced the number of inspections. A new program for spas -- estimated at a cost of \$200,000/year for one similar to pool regulation -- is not feasible. In fact, the department did draft proposed legislation which failed to get legislative support. So despite the agency's belief that spa regulation is important and more of a health problem than pools, nothing is being done at this time. Wisconsin and Michigan are in worse shape, as they were forced to totally eliminate their pool programs.<sup>4</sup>

The differing abilities and willingness of the various jurisdictions in getting involved with spas has three main effects. The first effect is the obvious lack of uniformity in spa regulatory treatment which has added confusion to the process of trying to deal with spas. The second effect is that it allows potential squabbling amongst the levels of government. In the U.S., direction may be given by the federal government, but it is often left to the direction of each state, particularly in daily administration tasks. The states, having primary authority, may delegate (or contract) the duties to

county governments. The state and county then work cooperatively. Local and municipal governments may also get involved on their own or in cooperation with states and counties to whom they are subordinate. Where no action is taken by states or counties, there is the likelihood that municipal governments may begin imposing standards or regulations which run counter to principles of other government levels, hence creating conflicts. A third effect is that the jurisdictions with more severe budgetary constraints are more susceptible to seeking short-cuts or accepting outside information which is weak or detrimental.

All of the above considerations represent real occurrences and they demonstrate some of the current weaknesses. Another very important potential weakness exists which, as of yet, appears unresolvable. This is the aspect of effective enforcement of regulations. Besides typical enforcement problems, spas present an additional problem. In reference to the variability of spas discussed in Chapter 2, we have a situation where spa water conditions can literally change in minutes, and thus the costs for effective monitoring and enforcement may become excessive and the efforts frustrating. This, in part, is reflected in the expression of some health officials that regulation may be counter-productive.

A final major weakness is that public health departments have to show care to avoid liability if serious problems arise. In light of budgetary and enforcement problems, a dilemma regarding liability is created. The uncertainties involved place

a great deal of burden on all parties concerned if a question of liability does arise. Because clear and consistent policy directions are lacking, it will be more complicated and messy to sort through a problem case. The question is; has a norm of satisfactory government responsibility toward public spas been reasonably established to offer guidance?

### The Operators

There is absolutely no clear pattern of operation or behaviour on the part of the operators. In virtually every aspect of operation, with the possible exception of observing the 104°F temperature limit, there is extraordinary inconsistency from operation to operation and even within the same operation from day to day. Operators are often poorly informed of proper procedures, and where they have been informed, they have been confused from receiving different information from all kinds of sources. They pick up information from: vendors they deal with, previous pool operation experience, written materials, manufacturer product instructions, educational programs provided by both industry and public agencies, and by comparing notes with other operators. Invariably, management has become a trial and error process based on differing biases which may or may not be justified. These biases are so varied that it is impossible to disaggregate them.



The absence of any systematic or logical pattern of current spa operation makes it futile to characterize actual practices. The only reliable characterization is that a large majority of operators seem to want some authoritative guidelines for operation -- with the opportunity for flexibility according to individual circumstances. All want the simplest, least time-consuming, and least costly method of operation. The uncertainties and confusions experienced by industry and government are far more evident by the time they reach the level of the operator. This has overwhelmingly been the outstanding weakness found in the U.S. experience.

### The Spa Users

The level of awareness of spa health risks and proper spa water quality is exceptionally poor among the general public. As one county health official suggested; "The best thing that could be done with spas now would be to take out full page ads telling the public not to get in any whirlpool which is dirty, excessively foamy, discolored, or you can't see the bottom!"<sup>5</sup> This health official was being somewhat dramatic at the time and realizes that there are also other problems, but his meaning was clear: the public sorely needs education about spa use and they have no idea of what risks they are exposed to. As shown in Chapter 2, there is a real weakness with the public understanding of health hazards and with being able to correlate a problem to spa usage. Therefore, complaints to health agencies

or to spa operators which might alert us to a problem are likely going undetected in many instances.

Further, spa users are negligent and/or ignorant of the consequences of their behaviour. Specific problems of horseplay, ingestion of drugs prior or during use, and failure to observe reasonable durations of use are all fairly common. Complaints of unusual behaviour have been made to health departments by other users. Among them; a woman washing her hair in spa and another case where a woman was shaving her legs and armpits in the spa.<sup>6</sup> However, the most common behavioural problems are with standard hygiene practices being violated: failure to take showers prior to use (which is even worse after a person is sweaty from exercise), entry into the spa with exposed cuts or wounds, and excessive oil, cosmetics, deodorant, or other substances on the user's body. These have long been prohibited by regulation with pool use and probably violated the vast majority of time. Although failure to observe these regulations with pools is undesirable, failure with spas can be catastrophic to efforts for properly maintaining water quality. Operators are at a loss as to how they can effectively enforce these provisions without employing impractical procedures. Still, either users must be sufficiently convinced of the importance of these things so as to act responsibly on their own, or operators must devise some method for enforcement. Good spa management otherwise may be severely limited by these behavioural abuses.

The above discussion characterizes the experience and weaknesses of the four principal actors. The other participants can be considered peripheral to the overall spa situation in the U.S. By this, it is meant that they have not been constantly involved or made a focus of particular objectives. Even though they should not be disregarded, they are not central to our considerations.

### Steps Toward Spa Water Quality Management in the U.S.

Since the turning point of acknowledging the uniqueness of spas, concrete actions have been taken by the various actors in an effort to alleviate spa public health hazards. The efforts fall into these categories: (1) Guideline and regulatory standards development, (2) Studies/research, (3) Education, (4) Incentives, and other measures.

#### 1. Guideline, Standards and Regulatory Developments

This area has received the most attention by everyone concerned. For spas, guidelines and standards have been developed to deal with three aspects which affect safety and health. They are:

- a. Design and Construction Criteria
- b. Installation Criteria
- c. Operation and Maintenance Criteria

Design, construction (and materials), and installation are not direct concerns of water quality management, as in the operations phase. However, operations can be severely hampered by failing to give thorough and careful attention to the pre-operational concerns. Further, standards for design, construction, and installation can act as a screening process to sort out publicly desirable and undesirable operators. The inference can be drawn that an operator who is initially reluctant, unwilling or unable to provide proper facilities, finances, and attitude might also consistently "cut corners" in the operational phase. Of course, this inference does not always hold true. Nor can it be assumed that an initially "unworthy" operator will properly carry on in the operational phase. What can be logically said is this; first, the purpose of standards for design, construction, and installation is to promote a consistent level of quality (the level being dependent on the standards, and the adherence to and enforcement of them) in the pre-operational areas which have an effect on the ability to effectively operate and manage spa water quality. Second, such standards can be used to discourage operators, who, for reasons of either lack of ability or willingness, may give inadequate attention or completely disregard concern for public health and safety. Third, imposition of standards in the pre-operational phase will mean additional costs for some or all of the following groups -- users, operators, consumers in general, public agencies and taxpayers. And fourth, the use of standards in these areas implies a restriction of choice for potential

public users, i.e., those individuals who might be willing to assume the risk of a "lower" quality facility at a reduced user fee would not have the choice to do so.

Ideally, we would want the spa operator to choose materials of construction and design which are structurally sound, take safety considerations into account and allow for proper operation (both for equipment and chemical treatment). We would also ideally want the operator to make such choices consistent with potential public users' willingness to pay for a certain quality of facilities. This brings up the common issues of the market versus intervention. For the moment, let us just recognize the difficulty of composing pre-operational standards. It is important to understand that there is a close relationship between pre-operational and operational standards, and that a solid argument can be made for considering both phases together.

This has been the approach by most organizations who have developed guidelines and standards. The industry, specifically NSPI, was the first to recommend and develop standards. In April, 1978 they published a set of guidelines covering pre-operational and operational phases, "Minimum Standards for Public Spas and Hot Tubs".<sup>7</sup> As cited earlier, the federal government working in conjunction with NSPI and state public health departments issued "Suggested Health and Safety Guidelines for Public Spas and Hot Tubs" in April, 1981.<sup>8</sup> Both of these publications are strictly recommendations and have no binding or legislated provisions upon operators or users. At the

state and local level, there are disarrayed efforts. Some states actively use swimming pool standards for spas, some do not use any standards. Even if states have not developed spa standards, some municipalities have gone ahead on their own. Illinois is an example. The state has done nothing with regard to spa standards and neither have the counties. However, there are miscellaneous regulatory activities taking place, the handling of which varies by locale. The state does approve permits for new spas, but only in the case where a spa is built in conjunction with a public pool -- then, a spa is considered an "appurtenance" of the pool and covered under the state act for swimming pools and bathing beaches.<sup>9</sup> Otherwise, spas are not required to obtain a permit. Cook County handles the permit approval process for the state for spas in that county. According to the head of that department, he uses the CDC guidelines as a basis for approval and he is mainly interested in the filtration, disinfection, and anti-vortex main drain construction provisions.<sup>10</sup> In neighbouring Du Page County, the state directly handles permits but the county may take care of operational matters. To date, Du Page County does not undertake specific spa inspection or regulation activities. In the smaller counties, the state would directly be involved, but other than the permitting described above, no significant actions appear to have taken place. In the Northwest suburbs of Chicago, the group earlier mentioned, the Northwest Municipal Conference has developed standards which will be implemented in their respective communities in Fall 1982. This work was done with the help of local members of the

NSPI, Midwest Chapter and drew primarily upon the suggestions provided by the NSPI Minimum Standards and the CDC guidelines. The group added a few more stringent provisions, notably with regard to filtration and as of last word, they "are reviewing the code with a view toward revising some of the definitions and considering prohibiting wood tubs. (They) also plan to add a paragraph to the caution sign regarding the hazard to pregnant women."<sup>11</sup> The city of Chicago is also close to enacting a spa code and has relied upon representatives from Jacuzzi Whirlpool Bath Inc. and Kohler Co.<sup>12</sup> The major input seems to be from Jacuzzi and from their test/standards coordinator Perry Meikle, located in California.<sup>13</sup>

Other efforts are being made throughout the nation in various ways. For example in Dade County Florida, the Associated Swimming Pool Industries association (a small regional pool trade group separate from NSPI) has formed a joint committee with NSPI to establish standards for their county.<sup>14</sup> Peripheral actors have also acted. The International Association of Plumbing and Mechanical Officials (IAMPCO) has published "Uniform Swimming Pool, Spa, and Hot Tub Code" for plumbing.<sup>15</sup> This document paved the way for the International Congress of Building Officials to agree on phasing out their separate code in the next three years.<sup>16</sup> Underwriters Laboratories has been also working on standards for spa electrical requirements since 1979 and recently published guidelines UL-1563.<sup>17</sup> Other efforts have taken place on a smaller scale, but major efforts at developing standards and regulations are underway and will

continue through 1983. It is interesting to note that industry has been the prime mover in this direction. One industry member stated in September 1981;

The grace period is up. Codes are coming. It is now just a matter of deciding whether we want to have the codes forced on us, or whether we will participate in formulating these regulations. Do we want to act, or react? It's taken us eight months to isolate the course of action -- now we need to move quickly.

Morrow observed that there are 10 states actively involved in initiating codes that will affect the spa industry. He added that many states already have codes, most of which are based upon inaccurate data and lack built-in updating mechanisms.<sup>18</sup>

The most significant action, however, is being undertaken by a group composed of industry members, regulatory agencies, public health officials, other safety/health organizations and sponsored by the National Sanitation Foundation. Efforts were initiated in September 1981 and are continuing. Results may be available sometime during Fall 1982. The purpose of this conference underlies the significance of uncertainty in spa water quality management. This select group of people from many sectors has been working on developing spa health code standards.<sup>19</sup> Thus, despite all prior activity in this area, it is evident that a number of experts think that the present guidelines are insufficient. This committee is addressing five priorities:

- 1) Defining the areas of research which will give insight to the solution of problems of the industry groups.
- 2) Biocides and how they relate to the hot tub rash as well as hot water microbiology of organisms in the hot water, as



compared with the cooler swimming pool water.

- 3) Hot water chemistry as it relates to the fluctuation of temperatures.
- 4) Hyperthermia and the reaction of the human body to temperatures above 104°F.
- 5) the general safety of spas and hot tubs as it relates to hair and body entrapment.<sup>20</sup>

As a means for addressing spa water quality, the committee has developed a format for standardizing water samples used to evaluate sanitizing products and procedures.<sup>21</sup> It is as follows;

- a pH factor of 7.2 to 7.8
- total organic carbon as 200 ppm glucose
- total Kjeldahl nitrogen as 100 ppm urea
- total dissolved solids as 300 ppm sodium chloride (Na Cl); 50 ppm potassium sulphate (K<sub>2</sub>SO<sub>4</sub>)
- hardness as 200 ppm calcium chloride (Ca Cl<sub>2</sub>); 200 ppm magnesium chloride (Mg Cl<sub>2</sub>)
- alkalinity as 100 ppm sodium bicarbonate (Na HCO<sub>3</sub>)
- oil and grease as 50 ppm Johnson & Johnson Baby Oil
- additional chemical measures include; (1) electric conductivity, (2) oxidation reduction potential; and for inoculation tests: (1) 10<sup>5</sup> per ml each of E Coli, *Pseudomonas aeruginosa*, and *Staph aureus*.
- samples are to be stirred during the test period, and once placed in the media, they are to be removed at uniform time periods -- 1, 5, 10, 15, 30, and 60 minutes -- to assess disinfection efficacy of the chemical or disinfection

device.

The efforts by this committee sponsored by NSF may represent a major breakthrough in the technical area of spa water quality. It is significant to observe that the awareness and acceptance of the uniqueness of spa water is the key to making progress with the problems. It is much easier to understand all the confusion, inconsistency and lack of major public action with spas when the work of this group is considered. A solid consensus (of opinion) about gauging the efficacy of disinfection does not exist up to this point tells us a great deal about the difficulty of uncertainty in spa management so far. The U.S. has experienced a rapid growth in public spa use with potentially significant health risks attached, and we have had no clear understanding of how to evaluate the primary aspect of disinfection. Whether or not this group produces worthwhile results for spa management policy use, two conclusions emerge.

1. The application of swimming pool standards to spas is not only inappropriate, but it may be extremely misleading, and efforts to remedy this situation are imperative for reducing risks.

2. Standards and regulations developed up until now are subject to revision and possible extensive revision. For if we have only recently begun to formulate an accepted means for evaluating the effectiveness of disinfection specifically for spa water

conditions, it will take time to establish those methods and determine our actual spa water quality status in public facilities. This could lead to major changes in several areas including equipment, management techniques and user guidelines.

Finally, a recent survey by NSPI, reported January 1982, seems to indicate that the majority of public health officials rely on NSPI standards for pools and spas. Sixty-one percent of the respondents said that they used all or part of those standards. Of 95 responses, 90 were using codes for public pools; of this number, 36 used part of NSPI's standards and 14 used them entirely.<sup>22</sup> It is interesting to observe that almost 50% more officials used codes for pools, but not spas, and only about 10% more relied on NSPI for pools but not spas. Further, the response of NSPI senior vice president Larry Paulick illustrates the motivation for industry involvement with standards;

. . . wide spread use of NSPI standards ensures a more uniform set of codes among separate geographic areas. This, in turn, provides a more unified method for industry products.

The more public officials who use NSPI standards, the better it is for our members. When a builder can use identical specifications from one jurisdiction to another it saves time, money, and greatly reduces the chance for miscalculations. Unified use of standards simply provides a better market.<sup>23</sup>

It is neither accidental nor a matter of altruism that the industry has been the major initiator of standards for spas. As the above statement demonstrates, industry is well aware of the benefits of their participation and initiative.

## Studies/Research

A number of efforts in this area have been previously referred to in other chapters and duplicate mention is unnecessary here. However, two other efforts do deserve mention. The first is a \$41,000 study on *Pseudomonas* backed by the International Spa & Tub Institute (ISTI) (1977). This work, conducted by an Oregon microbiologist, noted for expertise on *Pseudomonas*, will study the relationship of the organism to spas and hot tubs. Results of this work so far may have had influence on the state of Oregon's opposition to wooden hot tubs and also upon the later organized NSF Conference described in the preceding section. ISTI has plans to promote further studies on the whole area of "Hot Water and the Human Body", covering physiological and psychological aspects, among others. The University of Southern California and UCLA have been temporarily designated as the institutions who will conduct the research.<sup>24</sup>

A second study of note was conducted a few years ago under the auspices of the Division of Environmental Health in Alameda County, Ca. with assistance from university and other public health officials.<sup>25</sup> The study developed from a permit request of an operator to install a redwood hot tub. It was run for a period of one year and it produced these immensely important results:

First, The conclusion of the study "showed that if proper measures were taken, a redwood hot tub spa could be operated in a safe and sanitary manner."<sup>26</sup>

Second, a number of suggested operational guidelines developed from the study are more stringent than others formulated elsewhere. Of special interest is the recommendation of 2.5 ppm minimum free chlorine residual.

Third, the study places strong emphasis on consistent and conscientious monitoring and maintenance. The maintenance of chemical parameter levels was considered a highly important factor for controlling pathogens.

Fourth, it was shown that the operators given proper and thorough instructions could operate the spa correctly, and even more importantly, they had the ability to conduct frequent and consistent monitoring and water analysis over a period of time. These efforts included bacteriological sampling and testing, procedures normally considered too difficult for operators. Further, the operators' efforts were good -- differing only slightly from the results obtained by the Division of Environmental Health's sampling.

In view of the fact that this study was conducted for a reasonably long time on one of the toughest spas to operate (a redwood tub) with high demands on the operator, it is surprising that more attention is not paid to this work. By this, it is meant that the study, at an early stage of the U.S. experience, proved that operators with guidance and cooperation from knowledgeable spa and health authorities could handle spa water quality management. Therefore, it would seem logical to exploit knowledge of how this learning process was achieved and why it was effective. Further, it would seem reasonable to pursue

additional similar efforts in other places.

### Education

Attempts to educate both operators and spa users have been made to varying degrees and by differing sources. The industry, both within and outside NSPI, has sponsored seminars, printed materials, and run special educational programs at consumer product shows such as one held in Long Beach, Ca. in 1981. NSPI has gone to the length of printing specific spa safety precaution signs which are available for use.<sup>27</sup>

On the governmental front, education attempts have been relatively minor on the whole. In believing that 80 percent of spa problems are due to a lack of operator knowledge of proper maintenance, Paulick of NSPI is quoted on the subject of governmental education efforts;

We realize that public officials are understaffed and underbudgeted and so they can't be depended upon to get the information to the owner/operator. Thus, we realize the need for developing information and disseminating it to the owner/operator, also pointing out to him that this will increase his return on his investment.<sup>28</sup>

Our earlier discussion regarding the current constraints on government agencies is consistent with this explanation for the relatively modest efforts by public health agencies. However, it is evident from both continuing spa problems and field research interviews with operators that educational efforts are still

deficient. Part of the reason for this is the limitation of industry to "do it all". But two other considerations may be important. One is the seeming failure to notify the public of the risks involved in spa use. Perhaps greater emphasis in this direction would spur more attention being given to proper maintenance. And secondly, the educational efforts have been sporadic without having any organized approach or built-in institutional mechanism. This is probably the biggest weakness because our situation with spas must deal with a high turnover of people -- both spa users and operator personnel. As a result, educational efforts may be lost through inadequate procedures for transmitting knowledge and experience.

However, it is noteworthy that attempts to educate the consumer are beginning to take place. King County, Washington (where Seattle is located) recently published a consumer pamphlet entitled, "Staying Happy & Healthy in Your Spa & Hot Tub".<sup>29</sup> Reports are that the initial 8,000 copies rapidly sold out and a second printing was required. And even Vogue Magazine has moved to warn consumers, publishing in its January 1983 issue a short article on rash problems in spas and hot tubs.<sup>30</sup>

### Incentives and Other Measures

It appears that there has not yet been any type of financial incentive actions taken in the U.S., but there is evidence of non-monetary incentives through praise, recognition,

and cooperation from public health officials to operators. These efforts seem to be fairly successful. The Seminole County Health Department in Florida has begun a program of awarding operators for outstanding maintenance of water quality and appearance. The department's philosophy has been "to come down hard on those facilities or individuals in violation of the Sanitary Code but also to offer assistance in the prevention of problems with pools and spas."<sup>31</sup> And they believe it is important to recognize those people who conscientiously work hard to protect public health.

Another type of cooperative approach was described in an interview with one municipal health official in Illinois.<sup>32</sup> He believes that it is important to work with owners of facilities on more than just simply a level of meeting standards and enforcing regulations. Many of the owners of facilities he deals with are small business people who have limited financial resources or for reasons of ignorance, pressures, or time constraints generally manage their business poorly. This health official, when encountering violations, has found it successful to require the operator to make changes on a staged priority method based on the element of hazard and the owner's financial capabilities. Thus, rather than demand compliance all at once, the operator is given the opportunity to stretch the costs over time. Further, where it is appropriate, the health officer will offer suggestions on general business and management practices which an operator may be overlooking. In this instance, it is viewed that an operator's inability to properly maintain the



facilities may be the result of not recognizing the need for making management adjustments in areas unrelated to maintenance.

These efforts are interesting and perhaps could be applied in other places. The reason for their mention is not to specifically recommend those approaches, but merely to point out that methods other than the typical ones have been tried in conjunction with spas and proven at least moderately successful. This suggests that in considering public policy formation, it is worthwhile to postulate such alternatives or even possibly more creative ones.

#### Summary of the U.S. Experience

It is apparent that the driving force for seeking spa water quality solutions has originated from the spa industry with lesser impetus from government. Efforts by the industry have been generally helpful and in the public interest. However, it should be recognized that these efforts are based on selfish interests foremost. The threats of undesirable government intervention have been a strong motivation for industry action. More importantly, the reality is that if spa water quality is not solved and serious problems continue to rise in public awareness, users of spas would probably decline and the spa market would lessen and maybe even collapse. Therefore, there is sound reason to think that the industry can be counted upon to pursue spa water quality objectives with as much, or possibly

more, enthusiasm than government agencies.

The dominance of the industry raises a couple of serious questions though. The first is; are users and non-users being properly and adequately informed of the hazards? -- i.e. is there a "process for approved standards"? That question could only be answered authoritatively through an extensive public survey, beyond the scope of this study. Yet, it is clear that industry has a tendency to discourage, downplay, and minimize the public reporting of risks for the obvious reason of not wanting to scare people away from using spas. In fairness to the industry, this attitude can be present without casting any disparagements on their intentions or actions. For it is quite normal for any group or individual to muffle reports about their products and services until the reports are well substantiated. There is normal concern about permitting false alarms or unwarranted slander. Regardless, this still leaves a void of information with the public in the gray areas of hazard. Even if hazards did not warrant explicit warning at a particular stage, a weakness exists because users and non-users might not have the means of judging the hazards for themselves. It is not just a question of user and non-user ignorance, but also that users and non-users are in the position of having to almost exclusively depend on operator competence and disposition for their health and safety. This raises doubts about the existence of a "process for operator accountability".

The second question raised by industry dominance concerns

the ability and right of this group to exercise such influence on the overall process. There is little, if any at all, input from operators and spa users apparent in the development of spa management policies and direction. This not only raises obvious value questions, but doubts regarding the effectiveness of policy without the active involvement of the two major participants should also be raised. Earlier discussion of the management and behavioural problems highlights this point. If it is so well-recognized by the experts that maintenance is the overwhelming key to spa water quality solutions, it would seem natural to place greater emphasis on the involvement of operators and users in the policy process or at least to devote much more effort and institutional structuring toward bringing the learning and experience of these participants to the forefront. This question creates concerns about the availability of a "process for social learning".

It does seem evident that the technical approach, specifically the route of standards and regulation (also education where possible), has prevailed in the U.S. experience for developing spa water quality management policy. The criticism here relates to our earlier consideration of standards and the problems of uncertainty stated in Chapter 2. There is the real possibility that this technical approach will lead to our "tools becoming our objectives." By designing a system for dealing with the health and safety hazards which focuses on operators meeting certain criteria established by the experts, the U.S. experience is largely ignoring the vital interactive

factors concerned with the user-operator sphere. This is not to criticize the work which has taken place -- it may very well prove excellent for the short term. The question is; can it be made to work in the current context of policy design for the long term?

What Is Missing From the U.S. Experience to Make  
Spa Management Safer and More Effective?

The inconsistency or complete absence of spa standards within state and local jurisdictions is a failing in providing spa users (and operators) a solid base of information necessary for evaluating and reducing hazards. Interviews with operators indicated that they wanted this type of authoritative guidance. Industry and other private initiatives have been helpful, but these efforts have been diffused and not always consistent themselves. Further, industry efforts are always subject to credibility questions because operators, users, and the public may suspect those efforts to be self-serving to industry.

Without any form of organized policy toward spas, the lack of provisions to account for externalities is very disturbing. It only takes one poorly-managed spa operation to start an epidemic of disease amongst the population at large, and once started, the problem may be difficult to contain as recent experiences with Herpes and AIDS disease have shown. This is a serious deficiency in the U.S. situation with public spas.

No truly representative process for decision-making with

spas has yet been undertaken. With the possible exception of a few local areas (and this is questionable), no decision process has allowed for user or public participation, and operators have rarely been involved. Thus far, all decisions have been dominated by the public health and industry interest sectors. There does not appear to be any "process for approved standards" consistent with our criterion.

Little, if any, attention has been paid to measures for dealing with uncertainties in spa management. No studies have really examined the extent of hazards and clearly identified what are risks and what are uncertainties. Although, most spa experts intuitively recognize the importance of operator and user behaviour to overall spa safety, little has been directed at dealing with the problem except for scattered and minor educational programs. Public and private efforts, where they have been undertaken, have focused more on providing instructions or warnings with little or no effort toward training operators, devising risk indicators for users, or installing a learning process for dealing with spa hazard problems. Positive incentives and an environment for a social learning process are non-existent because of factors listed above and because no real significance has been attached to their need as of yet.

In brief, the U.S. experience fails to meet all of our criteria for spa policy design. This is not surprising, though, because spa policy has not been given adequate attention overall.

Footnotes - Appendix D

<sup>1</sup>"Manufacturers Council Takes Stand on NSF Issues," Pool & Spa News, February 22, 1982, pp. 8 & 108.

<sup>2</sup>Nancy Iran Phillips, "Hot Water Industry Pulls Together on Skin Rash Problems," Swimming Pool Age, April, 1982, pp. 11 & 36.

<sup>3</sup>Allen V. Kneese and Charles L. Schultze, Pollution, Prices, and Public Policy Resources for the Future and The Brookings Institution, (Washington, D.C.: The Brookings Institution), 1975, p. 7.

<sup>4</sup>Interview with Dave Antonacci, op. cit.

<sup>5</sup>Interview with Roy Dzieranowski, Cook County Health Department, July 12, 1982.

<sup>6</sup>Interview with Daniel Tarry, op. cit.

<sup>7</sup>National Spa & Pool Institute, "Minimum Standards for Public Spas & Hot Tubs," Washington, D.C., 1978.

<sup>8</sup>U.S. Department of Health and Human Services, Suggested Health and Safety Guidelines for Public Spas and Hot Tubs, Public Health Service, Centers for Disease Control, Atlanta, Ga., April 1981.

<sup>9</sup>Illinois, Minimum Sanitary Requirements for the Design and Operation of Swimming Pools and Bathing Beaches, Department of Public Health, Division of Swimming, Pools and Recreation, Springfield, Illinois, February 1976. (Note: these regulations have been revised somewhat since that time, but published copies are not available.)

<sup>10</sup>Interview with Roy Dzieranowski, op. cit.

<sup>11</sup>letter from Daniel Tarry, Environmental Health Officer, Village of Arlington Heights, August 3, 1982.

<sup>12</sup>John Frantz, "Midwest News," Pool & Spa News, Feb. 8, 1982, p. 128.

<sup>13</sup>City of Chicago, Proposed Public Spa Code, Revised March 8, 1982, Perry Meikle, Jacuzzi Whirlpool Bath, Walnut Creek, Ca.

<sup>14</sup>"Florida News," Pool & Spa News, September 21, 1981, p. 86.

<sup>15</sup>"IAPMO, ICBO Agree on Code", Pool & Spa News, April 5, 1982, pp. 1 and 114.

<sup>16</sup> Ibid

<sup>17</sup> "UL Looks at Spa Safety Hazards", Pool & Spa News, April 5, 1982, pp. 40 & 42.

<sup>18</sup> Jorian Clair, "Spa Health Code Action Planned; ISTI to Meet with NSF in October", Pool & Spa News, September 21, 1981, p. 98.

<sup>19</sup> Ibid

<sup>20</sup> Nancy Iran Phillips, op. cit.

<sup>21</sup> Jorian Clair, "Spa Health Code Action Planned; ISTI to Meet with NSF in October", op. cit.

<sup>22</sup> "New Awareness Shown For Pool/Spa Safety Needs", Pool & Spa News, January 25, 1982, pp. 146 & 148.

<sup>23</sup> Ibid

<sup>24</sup> "ISTI Backs Pseudomonas Study; Causes, Prevention Sought", Pool & Spa News, February 9, 1981, pp. 1 & 148.

<sup>25</sup> Journal of Environmental Health, January/February, 1979, pp. 189-193.

<sup>26</sup> Ibid , p. 192.

<sup>27</sup> "Spa Spectacular Attracts 13,000 Consumers," Pool & Spa News, August 17, 1981, pp. 8 & 96.

<sup>28</sup> Nancy Iran Phillips, op. cit. , pp. 11 & 36.

<sup>29</sup> Seattle - King County Dept. of Public Health, Seattle, Washington, March, 1981.

<sup>30</sup> Vogue Magazine, January, 1983, p. 84.

<sup>31</sup> Helen Donigan, "Industry News," Pool & Spa News, February 23, 1981, p. 14.

## APPENDIX E

### The B.C. Health Act And Its Provisions for Spas

The following special provisions for therapeutic pools are contained in the B.C. Health Act in the sections pertaining to regulation of public swimming pools, spray pools, and wading pools.

#### Part IX--Therapeutic Pools

84. (a) Parts X and XI of these regulations shall not apply to therapeutic pools.

(b) Provisions of Part IX of these regulations shall govern the construction, operation, and maintenance of the therapeutic pool, notwithstanding any conflicting provisions elsewhere in these regulations.

85. The recirculation rate through the filter system shall be sufficient to pass the entire volume of the pool in one hour or less.

86. If a therapeutic pool is operated as a health establishment, the manager shall be responsible for the continuous supervision of bathers. At all other establishments where a therapeutic pool is operated, the manager may be required by the Medical Health Officer to employ a person to be responsible for the continuous supervision of bathers.

87. Seats and benches shall have a nonslip surface and the edges shall be marked in a contrasting colour.

88. Pool walls shall have a smooth finish to facilitate cleaning.

89. A maximum velocity of water through the drains of any of the recirculation systems shall be 1 1/2 feet per second.

90. A minimum of one toilet and one shower shall be provided conveniently near the pool for each sex.

91. Pools less than 100 square feet in area may have a reduced walkway width of 2 feet for up to 75 percent of the pool perimeter. The access to the pool shall be from a walkway 4 feet or greater in width.

92. A clearly visible notice or warning sign shall be posted at all entrances to the pool, stating such directions necessary for the safety of the patrons.

93. A clock of sufficient size and design shall be located to be seen by those in the pool.<sup>1</sup>

In addition to these provisions, a maximum temperature limit of 104°F is now recommended and notices to this effect have been given to spa facilities by appropriate health agencies.



An examination of the above provisions reveals the following weaknesses in existing spa policy:

- (a) Section 85 addresses the need for improved spa filtration systems. However, the requirement of a one hour turnover rate may be inadequate. The CDC guidelines recommend a turnover rate of every 30 minutes, and the proposed guidelines of the Canadian Swimming Pool Association recommend a rate of every 15 minutes. This section fails to address other important spa filtration matters such as the types of filters and required cleaning of filters.
- (b) Section 86 is a helpful guideline particularly in regard to prevention of hyperthermia and drowning hazards if this provision is adhered to by operators and enforced by health officials. However, it assumes that spa facility personnel are adequately trained to assist bathers and to take appropriate measures if necessary. Without such assurance, this section is considerably weakened.
- (c) Section 87 is a typical safety provision which may help reduce accidents caused by visual hazards.
- (d) Section 88 appears to be a provision designed to improve sanitation. However, if spas are not required to be drained and cleaned at periodic intervals, this section is meaningless.
- (e) Section 89 appears to be a provision intended to reduce drowning hazards from entrapment. However, the velocity of water is only one part of the problem. The size of drain and other outlet openings and the type of outlet grate covers is

equally important especially in the case of children who are prone to putting parts of their bodies into openings.

- (f) Sections 90 & 91 do not provide added health and safety protection from hazards associated with spas.
- (g) Section 92 is unnecessarily vague by failing to specify what warnings and directions should be posted. Interviews with two operators of separate facilities demonstrated the weakness of this provision. One operator indicated that two warnings are required; (1) that users be advised that a maximum time limit of 10 minutes in a spa be observed and (2) individuals with heart problems should not use a spa without a physician's approval.<sup>2</sup> Another operator was aware of the Health Act's general provision, but he knew of no specific required warnings. His facility posts a number of warnings and directions based upon his knowledge and judgement.<sup>3</sup>

It is evident from the vagueness of Section 92 and the inconsistent practices followed by operators that a serious weakness exists in informing users of hazards and appropriate behaviour. It appears that existing spa policy in this regard relies upon the discretion of either local health inspectors or operators. In light of the numerous special precautions advised in other jurisdictions and by most experts, the vagueness of Section 92 is a serious deficiency.

- (h) Section 93 provides users a means for judging their duration of spa use. However, no provisions are made for providing

means for users to judge other conditions, such as temperature, disinfectant levels, pH, or bacterial presence.

In summary, the existing provisions for therapeutic pools in B.C. are inaccurate, incomplete, and vague in view of current technical and scientific knowledge. The one exception is the recently recommended maximum temperature limit. Visual, drowning, and hyperthermia hazards are addressed only to a minor degree. Pathogenic hazards, as specifically related to spas, are not addressed.

The present legislative set-up in B.C. leaves our study jurisdiction vulnerable to problems. As repeatedly pointed out, it is not only inadequate to treat spas like pools -- it can also be quite dangerous to do so. Examination of specific key parameter requirements in the B.C. Health Act underscore some of the major technical and scientific weaknesses in the four potential hazard areas.

#### Disinfection/control of pathogens -

One of the critical factors which has emerged from the U.S. experience is that levels of disinfection must be maintained on a significantly higher and more consistent basis than with pools. Standards for pool chlorination were originally designed to allow for a free residual bank capable of meeting expected chlorine demand in pools. The variable and volatile nature of spa water has proved this guideline to be terribly insufficient for public spas. Where changes and resultant

pathogenic hazards can so rapidly occur, a temporary let-down in disinfection capability can be dangerous. Thus, it is not surprising that many U.S. experts have recommended much higher chlorine and bromine levels (as high as 3.0 ppm) and stressed the importance of automatic chlorination and bromination equipment. Further, a number of experts now suggest that superchlorination procedures be taken after each bather use to destroy organic material which otherwise nourishes microorganisms. Great Lakes Biochemical Co. has specifically made this change in their user instructions.

Under current pool regulations here in B.C., operators are allowed to maintain chlorine residuals as low as 0.5 ppm, although the health department does recommend higher levels up to 1.0 ppm. However, even the level of 1.0 ppm does not give an adequate margin of safety for spas, particularly as bather load increases. The use of this standard, by default, actually encourages poor spa management. The one advantage of the application of swimming pool standards in B.C., compared to many U.S. jurisdictions, is that spas are required to have automatic chemical feeders. However, since these feeders are capable of breaking down or operating improperly, they must be periodically monitored and maintained. Further, they will not maintain sufficient levels unless initially adjusted to do so. As for superchlorination, there is no mention of it in the B.C. Health Act -- this is a very serious deficiency.

The crucial chemical parameter of pH has also not been

appropriately addressed within existing standards. B.C. operators must maintain a level of at least 7.4 roughly similar to the U.S. "ideal" range of 7.2-7.6. However, B.C. operators are allowed to exceed 7.8, a level considered unacceptable in the U.S. for both pools and spas. At levels above 7.8, it is well understood that chlorine disinfection efficacy is considerably reduced. The Health Act compensates for this by requiring chlorine levels of 1.0 ppm at pH higher than 7.8.<sup>4</sup> Again, with the case of spas, the rate of disinfection capability at this allowable level of pH is likely insufficient, especially as bather load increases. To make the point, spa operators in B.C. technically could run at ridiculously high pH levels and still conform to the standards -- the spa water could conceivably be clear, show acceptable chlorine levels, but the chlorine may be virtually ineffective as a bactericide. Furthermore, as pH increases scaling and calcification also increase. Scale can serve as a medium for organism growth and create calcification in equipment such as filters, pumps, heaters, and automatic chlorinators. If these items are not properly and frequently cleaned, the scale build-up will not only damage the equipment but lead to reduced flow and inadequate supply of disinfectant provided by automatic feeders.

#### Water Clarity -

With this concern, the application of the Health Act to spas is also detrimental. The chemical-disinfectant parameters, as indicated above, would eventually hinder clarity. Another

important factor affected is filtration. The current requirement is that filtration equipment be sized for a maximum turnover rate of one hour. This may be inadequate for spas, as some experts have advised rates as strict as a maximum of once every 15 minutes. If so, other factors involving the hydraulics of the system such as piping, inlets, outlets, etc. would also have to be adjusted accordingly. Backwashing or cleaning requirements of filter media also should be examined. Further, some experts believe that sand filtration is inadequate for spas and that only diatomaceous earth or cartridge filters are capable of capturing the finer particles and amounts of oil present in spa water. The Health Act allows use of sand filters, as do the U.S. codes. This possible weakness refers to earlier mention of a weakness resulting from industry involvement with standards.

Finally, the eventual build-up of total dissolved solids in spas requires periodic spa draining as a critical factor for proper management. This is completely disregarded in the Health Act. Despite controversy over recommended drainage intervals, experts do concur that this factor is highly important to clarity and disinfection.

#### Hyperthermia -

Although B.C. now recommends a maximum limit of 104°F, this study did not determine how rigorously this is enforced. Moreover, current regulations suffer the same drawbacks faced in the U.S. as to user awareness of risks, individual thresholds for time and temperature, and other uncertainties. Though this

hazard has been addressed in B.C., there are still weaknesses in the current policies.

#### Drowning hazards from entrapment

The obvious and most important weakness in existing policy is the absence of requirements for specially-designed spa drain and outlet covers (i.e. anti-vortex). These items should be included in spa construction and installation criteria.

#### Monitoring and Educational Efforts

Monitoring and enforcement of spa regulations are similar to those used for pools. Each facility is inspected at least once a year as part of a procedure for issuance of annual operation permits. From interviews with health official and operators, it appears that periodic inspections are conducted much more frequently, in some jurisdictions as often as once a week. This is a positive feature of the existing management system, and it may be serving to overcome some of the policy deficiencies.

Educational efforts primarily seem to be directed only toward pool operation. The Ministry of Health has published a well-written booklet for operators, entitled "Commercial Swimming Pool Operator's Guide".<sup>5</sup> This study did not find any educational materials on programs which were specifically concerned with spa management or with educating users and the public about spa hazards, recommended spa use behaviour, or

necessary special precautions.

Through comparison to spa standards and regulations formed elsewhere in Canada and the U.S., other weaknesses in the existing provincial policy can be shown. The above considerations only describe the major ones. It is important to understand that use of the Health Act for spas is seriously deficient -- and not simply a matter of "splitting hairs" or of some experts recommending unnecessarily high standards. Experts may disagree about the "best" spa water quality parameters, yet it is obvious that the requirements under the B.C. Health Act are far afield from current technical and scientific knowledge.

The continued application of these flagrantly inappropriate policies is potentially hazardous to public health -- this point cannot be overstated. The longer these policies remain in effect, the more difficult, too, it will be to alter the behaviour of operators. Increased resistance and lessened ability to change may become real obstacles for achieving spa water quality. Of greater concern, public health may be unnecessarily subject to potential hazards. If existing policies continue and spas increase in numbers and usage, the possibilities of serious disease or death may also increase. Lessons from the U.S. experience should be convincing enough to arouse concern.

#### The Importance of Public Awareness About Spa Hazards

The present situation is deficient and public values are



poorly represented due to lack of public awareness about spa management and hazards. The current use of swimming pool standards and regulations contained in the B.C. Health Act have already been identified as inappropriate to spas.

Until the government acknowledges current policy as being deficient, it is doubtful that the general public will develop an accurate awareness of spa hazards. Instead, the public is subject to misleading information about spas, as exemplified by a "herpes scare" report which occurred in 1982. This refers to reports which were made in the local media about hot tubs being sources for transmitting herpes.<sup>6</sup> Although the report was stilled by subsequent statements from medical and health experts, it raised significant attention -- to the extent that the news director of CFOX Radio was besieged with over two dozen calls within a few hours immediately after the newscast.<sup>7</sup> Another example occurred in a November issue of Ubysey.<sup>8</sup> In this case, an article, intended as a "college prank", claimed that the UBC Aquatic Centre (pool & spa) was being closed because of a herpes epidemic. Although the ruse was fairly soon uncovered, a number of people initially believed the reports and were quite upset, as subsequent letters to the editor revealed. More important, though, false reports such as these tend to create a "cry wolf" syndrome which may lead to laxity with serious and real potential hazards.

Footnotes - Appendix E

<sup>1</sup>B.C. Health Act, B.C. Reg. 289/72, December 1, 1972, "Swimming-Pool, Spray Pool, and Wading-Pool Regulations", p. 14.

<sup>2</sup>Interview with Lorenzo Lepore, Manager, Brentwood Racquet Club, Burnaby, March 21, 1983.

<sup>3</sup>Interview with Jim Bremner, Director U.B.C. Aquatic Centre, March 21, 1983.

<sup>4</sup>"B.C. Health Act," B.C. Reg. 289/72, December 1, 1972, p. 13. (At pH higher than 7.8, free available chlorine levels must be at 1.0 ppm, free available cyanurate chlorine and bromine levels must be at 1.5 ppm.)

<sup>5</sup>British Columbia, "Commercial Swimming Pool Operator's Guide," Ministry of Health, Division of Environmental Engineering, Victoria, B.C.

<sup>6</sup>CFOX Radio, morning newscast, Vancouver, B.C., September 9, 1982.

<sup>7</sup>Interview with Gary Marshall, News Director, CFOX Radio, Vancouver, B.C., September 9, 1982.

<sup>8</sup>The Ubyyssey, University of British Columbia, Vancouver, B.C., November 16, 1982, pp. 1 and 3.

## APPENDIX F

### A Sample Spa Operator Training Program

A 5-day program could be established with this outline as follows:

Day 1: Introduction to spa operations; their benefits and problems

a) Therapeutic/recreational benefits and public health protection

b) Equipment and facility operation and maintenance.

Day 2: Water Chemistry and Disinfection

a) Water balance and the effects of various parameters.

b) Disinfection procedures and relationships to other parameters.

Day 3: Spa Water Quality Management Skills

a) observing parameters and variables; testing and monitoring

b) drawing relationships from observation

c) anticipating problems

d) methods for adjustments and evaluating corrections

Day 4: Dealing with Others

a) training of spa management personnel

b) modifying spa user behaviour

c) safety and emergency preparations and procedures

## Day 5: Designing Spa Operation Plans

- a) general requirements
- b) creating alternatives and developing plans
- c) detecting needs for adjustments and incorporating the changes.

Certainly, this program could be modified or made more extensive, but it represents the basic areas which we would want to cover with operators. Advanced and refresher programs could be devised if the need and demand developed. Such programs should be carried out at actual spa facilities and registration fees should be charged to cover costs.

Specifically, we want to provide an understandable framework for operators;

With Public health: the importance of sound spa management and rationales for standards

With equipment: its interrelatedness to spa water quality and subsequent safety/health concerns.

With water chemistry and disinfection:

- a) Teach operators to first understand their initial water quality conditions; i.e., their water supply and its parameter components of pH, total alkalinity, hardness, trace elements, etc.
- b) Teach operators how to adjust the least variable parameters first and how to eliminate undesired chemical elements(e.g.copper,iron).

c) Teach operators how to focus on the three main factors of disinfectant levels, clarity, and temperature. Use as guides the following:

1) chlorine or bromine free residual/disinfection

high load spas: 3.0 ppm

med. to low load spas: 1.5 ppm

pH for both: 7.2-7.6

superchlorination:

high load - 10 ppm daily after spa shut-down

low load - 5 ppm daily after spa shut-down

pathogenic control: *Pseudomonas* should be used as an indicator.

2) water clarity

high load - less than .5 (JTU's)

low load - .5 to 1.0 (JTU's)

Total Dissolved Solids:

high load - replace 1/3 of water when 500 ppm is reached

- 2/3 when 1000 ppm is reached

- all water when 1500 ppm is reached

low load - replace 1/2 of water when 1000 ppm is reached

- replace all water when 1500 ppm is reached

3) temperature

high load - maintain temperature at 102°F or less

low load - maintain temperature at 104°F or less

The above guidelines merely reflect person opinion as to proper levels which might be used as starting points. It tries to account for the two-tiered difference of spa bather loads and uses conservative recommended parameters. Local actors might want to adopt different initial standards and also provide guidelines for other parameters and operational methods, such as shown in Appendix B. The important points, though, are; (1) that these initial guidelines should be flexible and operators encouraged to experiment (within reason) with varying them, and (2) operators should be taught to maintain the less variable parameters (e.g. total alkalinity, hardness) on a general basis and to carefully monitor the changes and effects of the three main areas, and (3) methods should be taught for handling the most variable conditions.

d) Operators should then be taught how to observe and associate external effects on spa water quality; such as number of bathers, types of bathers, the environment outside the spa, etc. These again should be related to our three main factors.

#### With Management Skills

This area of training should integrate the learning process from the first two days, and then this should be placed into the context of practical considerations, e.g., if disinfectant levels appear inadequate, the operator should incrementally increase the dosage until the problems seem rectified -- then perhaps to decrease the dosage incrementally in order to learn

the proper range for his operation.

### With Dealing with Others

Spa operators should be taught how to deal with other people involved in the spa system and that control or good management of spa water quality is dependent on these other people. Theoretical characterization of behaviour and motivations and practical methods for achieving cooperative behaviour should be taught. Operators should also be prepared and have provisions for handling emergencies.

With Designing Spa Operation Plans The final section of training would attempt to pull together the previous four days of learning. Spa management uncertainties should be highlighted and operators should be made keenly aware of the importance of reducing uncertainty and dealing with surprises. It should inform operators of the basic features which must be included in a plan for approval, and then stimulate thought on alternatives. Existing plans can be used as examples; and operators should be encouraged to think creatively and design plans appropriate to their facilities and patrons. Plans should be devised using both behavioural and technical perspectives. Ideas could be suggested as to how to obtain professional consultative services, references, or monitoring arrangements. Finally, the operator should be taught how to use his plan as a guide for operation --

i.e., using it in coordination with implementation. Thus, the operator would want to understand how to evaluate problems with the plan and then how to make adjustments. Changes should be submitted to the health department for approval.

Overall, we want to provide a general format for operators and ideally we would want to present this in an interesting, and even fun, way so as to create a willing and cooperative atmosphere which hopefully would foster operator creativity and conscientiousness toward spa operation. Using the basic format as a starting point, operators could then negotiate the remainder of operational matters with the health department.



APPENDIX GA Sample "Plan of Operation"\*

Safe & Healthy Spa Fitness Centre

123 S. Main

Vancouver, B.C.

Facilities: 10 racquetball/squash courts, 10 tennis courts, 75 m. x 25 m. swimming pool, 4 hydrotherapy spas. 2 saunas, jogging track, exercise and weight room, mens' and ladies' change rooms, restaurant, snack bar, lounge, and merchandise room.

Membership information: 1000 member enrollment, monthly dues of \$100.00; court time, food, drinks and merchandise extra.

Hours of Operation: M-F, 6:00 a.m.-11:00 p.m.; Saturdays 7:00 a.m.-9:00 p.m.; Sundays Noon-6:00 p.m.; closed holidays.

Information regarding the hydrotherapy spas

Description of Spas & Equipment: The Centre is equipped with 4 separate spas, 110 sq. ft. each with volumes of 2000 U.S. gal. 2 spas are general purpose, 1 spa is for special therapeutic purposes only, 1 spa is for special recreational purposes only. Equipment specifications, sizing, and layout per architectural

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\*This is used solely as an example and it is not intended to be representative of any particular spa facility.

and engineering blueprints.

Expected Bather Load Ratio Per Spa: Not to exceed 1 person per 200 gal. of water (10 people allowed in at a time).

Methods of Water Quality Control and Sanitation:

1. Bromine and oxidizer        } disinfection &  
                                      } shock treatment
2. Ozone                                }
3. Sodium bisulphate (acid) or sodium carbonate (soda ash) as necessary to control pH and total alkalinity.

Staff

- 1 - Manager (on duty at all times)
- 1 - Physiotherapist (regularly scheduled to conduct therapeutic programs)
- 1 - Recreational/Fitness Specialist (regularly scheduled to conduct recreational programs)
- 16 - Part-time Attendants (scheduled on a staggered basis with 1 attendant per spa on duty at all times)
- 1 - Consulting Physician (as necessary)
- 2 - Maintenance People (alternate schedules)

I. Training of Spa Facility Personnel

- Managers will have administrative background and training and they will be familiar with all operations of the facility. They will attend Province training session and

also hold a recognized lifesaving certification.

- Physiotherapists will hold an accredited degree in Physiotherapy and a background in water therapeutic techniques.
- Recreational/Fitness specialist will hold an accredited degree in recreation/physical education and appropriate background,
- Attendant will hold a recognized lifesaving certification and be trained in-house on spa water chemistry, spa equipment, procedures, and interactions with spa users.
- Consulting physician will be licensed in B.C. and be available for consultation on programs, safety and health recommendations and individual user consultation as requested. Physician will be familiarized with physical and chemical spa operations.
- Maintenance people will be thoroughly trained on spa water chemistry and maintenance of spa equipment in-house and through available training programs elsewhere.

## II. Provisions for Notifying Users of Hazards

1. Each member will be provided a copy of the pamphlet "Safe Use of Public Spas".
2. Warning signs posted per the "B.C. Approved Standards for Public Spas".
3. Requirement of a physician's approval and any restrictions for each spa user; to be maintained on file.

4. Printing and distribution of any additional information as necessary.

### III. User Behaviour Requirements and Methods of Enforcement

1. All users will be required to take showers.
2. No person with an open wound, lesion or observable sign of external disease problem will be allowed to use the spas.
3. No person with serious illness will be allowed to use the spas.
4. No children under 3 years of age and no pregnant women will be allowed to use the spa (unless approved by the Centre's consulting physician).
5. No individual under the influence of alcohol or drugs will be allowed to use the spas.
6. No horseplay or other dangerous activities will be allowed.
7. No food, drinks, tobacco or any objects will be allowed in the spas or in the immediate vicinity.
8. No user will be allowed to remain in a spa for longer than 15 minutes at a time unless given prior approval by consulting physician and/or physiotherapists.

All members will be provided with these rules (and others if necessary) in their membership packet. Showers will be assured through design of a special "shower curtain" which all users will have to pass through to use spas. Attendants will be trained to see that these rules are observed by the patrons and request any violator to either refrain from the violation or

leave the facility. Any problems with compliance will be referred to the manager. An individual who refuses to comply will be expelled from membership.

#### IV. Equipment and Spa Unit Maintenance Procedures

Per the "B.C. Approved Standards for Public Spas". (The Centre reserves the right to changes and modifications subject to health department approval).

#### V. Water Quality and Sanitation Procedures

Per the "B.C. Approved Standards for Public Spas". (The Centre reserves the right to changes and modifications subject to health department approval).

#### VI. Monitoring, Testing and Record-Keeping

Per the "B.C. Approved Standards for Public Spas". (The Centre reserves the right to changes and modifications subject to health department approval).

#### Visible Notification of Water Conditions to Users

- a) 1 temperature wall clock and 1 thermometer per spa.
- b) digital wall display of bromine and pH levels.
- c) disk for judging water clarity will be embedded on bottom of spa which must be observable to users at all times.

d) one time clock for users to observe duration of spa use.

Users will be provided as a guide, "Safe Use of Public Spas", which indicates recommended parameter levels and potential consequences from insufficient levels. Signs will be posted near each wall display of conditions to indicate recommended levels according to standards. Parameter readings will be wired into the Centre's office and an alarm will indicate if parameters reach minimum levels. Attendants will maintain records of usage and this information will be coordinated with other physical, chemical and biological data as the basis for future management adjustments.

## VII. Safety and Emergency Procedures

Per the "B.C. Approved Standards for Public Spas". (The Centre reserves the right to changes and modifications subject to health department approval).

### Special Programs

I. Therapeutic and II. Recreational

#### Note:

It is beyond the scope of this thesis to suggest appropriate programs in detail. Professionals with expertise in these areas should be consulted. It is recommended that programs

be devised with further implementation and social learning objectives as described in Chapter 5. General program areas might include:

- a) programs to treat arthritic or other specific health problems of individuals
- b) programs for stress reduction and relaxation
- c) programs for treating and relaxing specific muscle and joint areas which are stressed by particular athletic activities (i.e. for joggers, skiers, etc.)
- d) social programs for organizations or gathering of friends on special occasions.

Other programs are possible and creative ideas can be developed into effective measures which protect public health while enhancing spa benefits.