WATER MALAYSIA '92

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KEYNOTE ADDRESS

I, II AND III

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IWSA

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ASPAC Into The 90s - And Beyond

by

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WATER MALAYSIA '92

KEYNOTE ADDRESS OF ASPAC CHAIRMAN
and
PRESIDENT OF THE MALAYSIAN WATER ASSOCIATION

Dato' Ir. Haji Omar Ibrahim

Mr. Chairman,
Ladies and gentlemen,

ASPAC INTO THE '90s - AND BEYOND

The nearer we got to this Conference, the more convinced I became that I might have bitten off more than I can properly chew in undertaking this ASPAC Perspective. But most of all, I hope you do not think me presumptuous in trying for I felt I should at least make the attempt. So there is nothing for it now but to plunge right ahead.

Ladies and gentlemen,

Most Asian children suffer from diarrhea caused by contaminated water at least once a month - many do not survive. More than one billion people are without clean water - half of them are Asians. By the year 2000 Asia will have 12 of the world's 25 "megacities" of more than 10 million people. The problems are not getting any simpler.

These are grim reminders from the Asian Development Bank in Manila in 1990.

Fortunately, we in ASPAC on the Pacific rim of Asia, stretching from Japan in the North to New Zealand in the South, are the lucky ones. At least, unlike the women in Calcutta, ours do not have to get up at 2 o'clock in the morning to put their pots in the "queue".

Even so, most of us have also fallen short of the International Water Supply and Sanitation Decade target. From WHO figures I have seen, our water supply coverage (excluding China) is about 85% in urban areas, and only around 60% in rural areas when the Decade ended in 1990. There is, therefore, still much to do.

But we have made progress.

Indeed a number of ASPAC member countries have made such tremendous progress that they are among the top in the world water supply league. On the other hand, we have areas where just safe water is still very much a matter of basic need. For example, Asiaweek even advises its readers that tap water is not safe to drink in most parts of Thailand and that even the locals shun it. But this surely cannot be the reason why the average person in Hongkong consumes more cognac than the average person anywhere else in the world - nor why, according to a local consumer association, Malaysians drink more alcohol in a year than people in many industrialised countries.

So vast is the contrast within the ASPAC region that when in Singapore, where, again according to Asiaweek, social rules are government-enforced, you have to be careful not to forget to flush public toilets if you do not want to run the risk of being fined S$150. On the other hand, when in the Philippines you have to be careful when admiring personal possessions because Filipinos are often generous to a fault, and may feel obliged to give you anything you praise too highly.

Not unexpectedly, ASPAC water supplies also vary widely from the very sophisticated to the very basic. But here it is not a question of custom; for who does not want good water at the turn of a tap? It is just a matter of hard cash. One has only to look at the Gross National Product - which varies from US$27,235 per capita in Japan to US$490 in Indonesia and US$360 in China - and see the level of water supply that goes with it.

If the level of water supply is a direct function of the economy, then the really good news for us in ASPAC is that there is a growing belief that the world is moving towards "An Asia-Pacific Century". The rapidly growing countries of East Asia emerged as the "most dynamic element" in world trade last year according to a report by Gatt. Gatt economists stress that while growth in global trade slowed to 3% in 1991, the expansion of trade and output remained "very strong" in Developing East Asia. In fact the economic growth in Asia in the last forty years has been astonishing, averaging 7% per annum as compared with 3% in Western countries. Hongkong's average personal income is now about US$12,000 and is expected to overtake that of the United Kingdom in the next few years - just as Japan's per capita income overtook that of the United States in 1989 and her GNP is now second only to Switzerland's. Together with Japan and Hongkong, Korea, Malaysia, Singapore, Thailand and Taiwan are regarded as "the East Asian tigers".

The 21st Century has also been labeled the "Age of the Pacific" when East Asia will once again become the centre of

world economy. Sensational as these labels may be, there is little doubt that the future in our ASPAC region is seen to be very bright by all those whose business it is to see these things. Surely, even economists, when there are enough of them in agreement, cannot be all be wrong?

All the signs point to exciting times ahead for ASPAC. But to what extent the golden "Age of the Pacific" is going to actually benefit the water supply sector will surely continue to depend upon the political will since almost all water supply operations in this region, big or small, are government operated to a greater or lesser degree, in one way or another.

The political will now is unmistakably towards privatization; and, what is more, the private sector is just as enthusiastic in its quest for investment opportunities in this fast developing region. Indeed privatization seems a world fashion and a global by-word these days. We were told that it is even being considered in various Eastern European countries at the ASPAC-IWSA international symposium on privatization of water supplies in Manila two months ago. In fact, on the opening day of the symposium itself, the International Herald Tribune's front page carried the headline that "Yeltsin Vows To Go Ahead On Sweeping Privatization".

Malaysia would appear to have gone farthest along the road of privatization in this region. The country is alive and throbbing with government and private sector interest, both local and foreign, looking for every opportunity for privatization in water supply undertakings. In fact there is already talk in the air of water undertakings going straight into corporatisation as a quick stepping stone to full and complete privatization where members of the public can buy shares in the water company.

Privatization of water supplies is good business. But, as the saying goes, the poor will always be with us. I cannot see any private enterprise willing to take on uneconomical rural supplies; far less water services to provide basic water supply to the urban poor, especially when we are to have 12 of the world's 25 megacities of more that 10 million people each. I believe there is a Chinese saying that as long as there is profit there will be people who will risk having their heads chopped off for it, but a losing business no one will touch.

It is the rural supplies and safe water as a basic need to the many who will surely continue to need it that we have to worry about; and must see that the "Age of the Pacific" does not pass by untouched. The national budget is never bottomless. Even in the best of times, there are always

competing needs to which water supplies seem to lose out - except, perhaps, when election time comes around.

In any case, one of the greatest difficulty of a water engineer in a developing country must surely be the problem of persuading politicians of the need for timely long term investments in water supplies when the horizon of politicians is from one election to the next.

This is particularly the case with regard to source development. It is never easy to get the powers that be to see that, because rainfall is so foremost among the vagaries of nature, you have to be prepared to see a lot of water going pass your intake into the sea, or a lot of water in your reservoir 49 years out of 50 if you do not want to run the risk of being short of water more often than once in 50 years. Admittedly statistics is not always easy to grasp, but one wonders if it is not, for that very reason, only too easy to pass over lightly as long as there are no problems during your term of office, and money can be spent on projects that will increase your chances at the next, and the next, election.

In the nature of things, the political will will always be what it is. It is we, I think, who must improve our powers of persuasion to incline that will to cut a bigger piece of the national cake, so beloved of national economists, for the water supply budget, in good times and in bad.

Sanitation is another area which cannot, and should not, be relegated to a back seat any longer. The 7% growth per annum over the last forty years of which we have reasons to be happy about has not been without its toll on the environment. Rivers are polluted and the quality of sources for water supplies are fast deteriorating with them.

It came as no surprise, therefore, to find ASPAC members very concerned over water quality. In a MWA survey of ASPAC members last year, water quality came in a very, very close second as a matter of most concern in a list of 30 different aspects of water supply operation.

Quite apart from increasing river pollution and the associated water treatment technologies and cost that go with it, what is a water engineer in a developing country to make of the relentless drive of water regulators in developed countries towards attaining the unattainable - a 100percent pure water - on the one hand, and on the other, the growing number of water experts, government scientists and instrument manufacturers questioning the validity and practicability of the standards they set? Are these parameters, some of which still beyond the limit of detection, realistic to the ASPAC region where just safe

water and adequate sanitation is still the basic need of many people? One can, and does, of course, fall back on the World Health Organization Guidelines; but even so, no one can afford to be oblivious to these water quality issues, even without mounting pressure from growing public opinion.

If it will clean up the rivers and keep them clean, the present ascendancy of the environmentalists is to be welcomed - though, I am sure, many an engineer must often have wondered if the pendulum has not swung too far towards environmental protection. It is good news that both the international development banks that influence our ASPAC area, namely the Asian Development Bank and the World Bank, are now placing very heavy emphasis on the environment in their operations. Nevertheless, let us hope that there will not be those among modern environmentalists who would have objected to the use of fire had they been around when fire was discovered on the grounds that fire is of the greatest hazard to the environment.

The issue that beat water quality in importance in the survey of ASPAC member countries by just one point out of a maximum possible 45 is the increasingly serious problem of unaccounted for water. It is serious for one of two reasons. For countries like Japan and Hong Kong, water is too costly to waste; for others where water resources are still relatively cheaper to develop, levels of unaccounted for water are getting too high for the "do nothing" option. Hence, in Japan and Hong Kong, where the unit cost of leakage is US$1.04 and US$0.42 per cubic metre respectively, UFW has been reduced to 15.4% and 22% of production. On the other hand, in Malaysia, where the cost of leakage is only US$0.08 per cubic metre, UFW is 43% - and rising.

Singapore, however, seems to be an exception to the dictates of either the high cost of water or high UFW for a very different reason; the rapid development of the island nation has long outstripped its very limited water resources. Singapore has brought UFW down to a mere 11% although the unit cost of leakage is only one US cent higher than that in Malaysia just across a narrow strip of water.

These statistics are taken from the International Report on UFW to the IWSA Congress in Copenhagen in May this year. From 17 national papers submitted for the Report, the International Rapporteur found that, with the exception of China, developing countries have the highest levels of UFW. Indeed China's 8% is the lowest among the countries surveyed, the next lowest being 9% in the Federal Republic of Germany. Among newly industrialized countries, UFW levels in Singapore, Hong Kong and Taiwan are about the same as, if not better than, those of some developed countries.

By regions, the smallest variation in UFW levels is in the East Asia region of China (8%), Japan, Hong Kong, and Taiwan (23%). The biggest spread is in the South-East Asia region of Singapore (11%), Thailand and Malaysia (43%). Melbourne registers a respectable 18%. Compared with these ASPAC countries, UFW levels in Europe range from 9 to 30%.

The achievements in China, Germany and Singapore show that it can be economically viable to strive for UFW levels as low as 10%, but this is probably unrealistic for most of us in the ASPAC region. The Asian Development Bank has used a 25% target for developing countries. This seems a reasonable figure within our reach, and a feasible minimum target to aim for. The over-riding factor, of course, must still be the appropriate UFW control policy to adopt that properly balances costs and benefits. An important factor in this equation though, in my opinion, is that better levels of service should be given greater weightage than it has been accorded in the past.

The main cause of unaccounted for water is, of course, leaking mains. It again came as no surprise, therefore, to find pipeline corrosion and pipe-network rehabilitation tied in third place with utility management in the survey of ASPAC members. The proof of this concern is the success of the ASPAC-PERPAMSI Seminar on "Non-revenue Water Control and Mains Rehabilitation" organised by The Indonesian Waterworks Association in Bali in October last year. More than 120 participants from 7 ASPAC countries had a 3-day session discussing 15 technical papers. The papers covered UFW control in this region, NRW and the economics of leak detection, pipe failures and their causes, pipe materials selection, in-situ pipe rehabilitation, and case studies of successful UFW reduction in this region. The seminar even went so far as to chart the future course of NRW control. It set realistic targets for achievement in the next 2 years, and identified 10 areas where ASPAC members should concentrate their NRW control efforts.

Since Malaysia had the highest UFW among the 17 countries in the IWSA Copenhagen report, it is not surprising that it is probably most actively establishing UFW control in this region at the moment. Viewing its very high leakage level with alarm, leak control is now seen as a necessary alternative to just building new works to meet rising demands. Consequently, network and treatment plant rehabilitation and upgrading were included for the first time in the current Five Year Plan and a hefty provision of US$135, or 12.25% of the water supply budget, has been allocated for it. The result of all this is that much has been done on studies and in the field. These are continuing apace and include an Asian Development Bank Study of 32 water districts.

This ADB study is by no means the first of its kind. Similar ADB studies have been carried out in Indonesia and the Philippines. I believe there is also considerable private sector interest in Indonesia. I expect we will surely see steps to rehabilitate and upgrade water supply systems quickened and lengthened to longer strides in the near future.

Turning now to the next subject of most concern in the survey of ASPAC members, utility management came in a very close third. Obviously, you may say, every water undertaking, big or small, has to manage ever better with new methods and technologies. But the surprise to me here is that it is not just utility management in the broad sense. The concern is very specific to management through information system, improved communications technology, remote meter reading etc. This item was one added to the original list by an ASPAC member and is considered very important by nearly everyone else as well.

I am afraid that there will not be time to go much further through the survey. I will do the next best thing by attaching a summary of the survey to the copy of this address that will be available to you as you go out afterwards.

In the time remaining, I would like to bring up another important matter not included in the survey - namely the institutional aspect of water management, which, I feel sure, will continue to be as important in the developing countries in our ASPAC region as in any other developing country anywhere in the world. One sure indication of a developing country is that, firstly, its water supplies are always divided into urban and rural supplies. Secondly, there is always an inevitable hierarchy of national, state, provincial and local governments; a whole myriad of national and sub-national agencies; and a whole host of ministries and description of committees responsible for some aspect of water supply or other.

In this fragmented and confusing state of affairs, what has come to be identified as the "need for institution building" will remain very real. Much as every developing county has come to expect institution building to be belabored at nauseam at every meeting of international agencies and non-government organizations (NGOs), the problem will be with us for a long time yet. As the Thai country paper to ADB's regional consultation in June 1990 puts it, "Thailand's development experiences ...during the past decade demonstrated very clearly that institutional strengths and management efficiency are the key ingredients to successful achievement in this sector. Weak institutions and policy

constrains, typical characteristics of a developing country, tend to put the country's development efforts at a disadvantage".

The paper goes on to conclude that "it would be unrealistic to expect outside help alone to solve problems and constrains". It occurs to me that this is particularly true of us in ASPAC. We have within our region everything and every aspect of water supply from the sophisticated and sublime to the very basic, simple and even to what might appear to be the ridiculous to someone from an effluent society. It seems to me that because we need to turn our hand to a greater variety of things in a developing country; our breath of knowledge is greater, if shallower. But we have the specialists too. We are, therefore, well placed to help one another, in the ideals of regionalism, to achieve the goals for which we have formed ASPAC within IWSA - namely, close cooperation - working together with those close at hand in the same region as a component in a global organisation for a better world for everyone in our particular field of endeavour.

Our big problem though is language. Because of the language barrier we do not get together in seminars and the like to exchange views and experience, or even simply to talk shop; nor do we simply communicate as easily or frequently as we would like to, or should. By default we leave it open for people from outside who speak the international language, English, better to us than we can speak it among ourselves, to "help solve our problems". There is nothing wrong in this of course, but it seems to me such a pity, and a negation of the idea and ideals of ASPAC. It will be even more to be regretted if this continues to happen in the coming "Age of the Pacific".

I feel that we must not let this happen. Much as our biennial ASPAC conference and exhibition have been valuable and enjoyable, we should do more in between conference, the language problem notwithstanding. We in ASPAC must provide the impetus to bring our water supply sector into the 2000s in step with the "Age of the Pacific". We must get closer together. We have had the very great pleasure of welcoming Australia and Macau into ASPAC since the last conference in Nagoya - and, hopefully, will be welcoming New Zealand also by the end of this conference. If we can have the Pacific islands and others on the eastern sea-board of Asia join with us in ASPAC, we will truly be an Asia-Pacific regional group ready for "An Asia-Pacific Century".

I think we have already made a good start. ASPAC countries with common boundaries have increased cooperation - for example, the supply of water from China to Hongkong, the on-going development of Malaysian water resources to increase

the supply to Singapore, and the proposal of piping water from the Indonesian island of Bertam to Singapore. The Indonesian Waterworks Association and the Philippines Waterworks Association have organised seminars for ASPAC within the last year. Thanks to the initiative and efforts of the Indonesian Waterworks Association, a Memorandum of Understanding for Cooperation in Water Supply Management and Improvement of Services and Training was signed by the waterworks associations of Indonesia and the Philippines during the symposium in Manila. A similar Memorandum of Understanding will be signed by the Indonesian and Malaysian waterworks associations in the course of this Conference. And last, but far from being the least, the growing cooperation and interest in ASPAC have brought so many participants so far from home to this Water Malaysia '92 Conference.

All this augurs well for ASPAC as we go "Into the 90s - And Beyond". If I should sound like preaching, please forgive me. If I sound carried away by what I am saying it is because I am sure that we can, we should, and we will all want to make ASPAC take its proper place, and play its proper role in the coming "Age of the Pacific".

Thank you.

SURVEY OF SUBJECTS OF INTEREST TO ASPAC MEMBERS

carried out in 1991

RANKING on total score	TOTAL SCORE out of a possible maximum 45	SUBJECT	RANKING BY ASPAC MEMBERS on a scale of interest from 1 (lowest) to 5 (highest)								
			AUS	CHN	HKG	IDS	JAP	MAL	PHI	SIN	THI
1	39	Unaccounted for water	3	4	5	5	3	5	5	5	4
2	38	Drinking water quality	5	5	4	3	5	4	5	4	3
3	37	Utility management; managing through information. For example, improved communications technology, remote meter reading etc.	5	5	4	4	4	4	4	4	3
	37	Rehabilitation of pipelines	4	3	3	4	4	5	5	4	5
	37	Corrosion control of pipelines	4	5	4	3	4	4	5	4	4
4	35	Management information systems	4	2	5	4	4	5	4	3	4
	35	Use of chemicals for water treatment	5	5	3	3	4	4	4	4	3
5	34	Pricing of water	5	1	4	4	5	3	4	4	4
	34	Telemetry of water supply	5	2	4	2	3	4	5	5	4
	34	Water resource and water supply management	4	1	4	4	5	4	4	4	4
	34	Advanced water treatment technology	4	5	2	3	5	4	3	4	4
	34	Pollution of water resources – monitoring problems and solutions	3	4	3	4	5	3	3	5	4
6	33	Performance measurement of water authorities	4	3	5	3	3	3	3	4	5

AUS : Australia
CHN : China
HKG : Hongkong
IDS : Indonesia
JAP : Japan
MAL : Malaysia
PHI : Philipines
SIN : Singapore
THI : Thailand

RANKING	TOTAL SCORE	SUBJECT	RANKING BY ASPAC MEMBERS on a scale of interest from 1 (lowest) to 5 (highest)								
on total score	out of a possible maximum 45		AUS	CHN	HKG	IDS	JAP	MAL	PHI	SIN	THI
7	32	Water supply disinfectant	3	4	4	3	5	2	3	4	4
	32	Community participation in the process of setting drinking water quality guidelines	5	5	3	2	4	3	4	3	3
8	31	Upgrading of treatment plants	4	1	3	2	5	5	3	4	4
9	30	Commercialisation of water authorities	5	1	4	4	4	2	3	3	4
	30	Community participation in setting standards of performance for water authorities	5	3	3	2	4	3	4	3	3
	30	Privatisation of water supply	4	1	4	4	5	4	3	2	3
10	29	Determination of economic lives of assets	3	4	3	3	3	3	3	3	4
	29	Sludge residual handling	5	1	3	2	4	3	3	3	5
	29	Taste and odour of drinking water	5	3	2	2	4	3	4	3	3
	29	Storage and handling of chlorine as a water supply disinfectant	3	1	5	3	3	2	3	5	4
	29	Comparing the pricing of services and tariff structures between water authorities and countries	4	3	4	3	3	1	3	5	3
11	28	Market approach to resource management	4	3	2	3	3	3	3	3	4
	28	Valuation of assets	3	3	3	3	3	3	3	3	4
12	26	Risk analysis on all business aspects, ie security of supply and risk/revenue tradeoffs	4	1	2	3	3	4	3	3	3
	26	Ultra-filtration	4	5	2	1	3	3	3	1	4
13	25	Effect of earthquake on groundwater	1	5	1	3	4	1	5	2	3
14	20	Effect of volcanic activity on groundwater	1	2	1	2	4	1	5	1	3

KEYNOTE ADDRESS II

Situation Of Water Supply In Europe

by

Ernest Reiter

President, European Union of National Association of Water Suppliers EUREAU

SITUATION OF WATER SUPPLY IN EUROPE

1. Historical Outline

The first large-scale drinking water facilities were built by the Romans at the beginning of modern times. The Roman Empire, which had brought the water worship to its peak in Rome, made a point giving all its citizens the advantages of good quality running water. As a result, all the big cities of that huge empire, covering most of Western and Central Europe, were endowed with remarkable water supply structures. These were generally fed from remote springs, and conveyed by gravity flow via different aqueduct systems. Some were underground, particularly in Central Europe. Others were overhead, like those in the Mediterranean area.

After the fall of the Roman Empire, these magnificent feats of engineering fell into disuse, either through lack of maintenance and repair, or through willful destruction by hardly civilized invaders.

Today, some of the most outstanding civil engineering works, such as the aqueducts of Nîmes and Segovia, respectively in France and Spain, and the water supply network in Pompei, still force the admiration of tourists, flocking to visit them from all over the world.

During the Middle Ages, only castles, monastries and churches had drinking water facilities worthy of the name.

The population had to make shift with scant local resources, and the use of water was reduced to the barest necessities. These resources, often of deplorable health quality, usually consisted of natural running springs, waterways or wells sunk near houses. The countless epidemics which wiped out a large part of the population, at more or less regular intervals, were the inevitable consequence of this serious situation.

It was only in the middle of the 19th Century that emerging industrialization in Western Europe gave new life to the development of water supply systems through the building of large-scale structures, the first since the departure of the Roman legions.

At the origin of this evolution was the rapid growth rate of populations round the new industrial centres. The very many epidemics and huge fires, like the on in Hamburg in 1842, no doubt provided extra incentive.

This trend towards building central facilities on a large scale, using new filtration techniques, originated in British towns like London, Liverpool, Glasgow and Manchester, before spreading to Continental cities such as Berlin, Amsterdam and Hamburg. It is interesting to note that, even before, a new filtration technique had already been set up in Paris for the removal of harmful suspended solids in the raw water. New knowledge in bacteriology was, in turn, profitably used to improve water disinfection methods.

This wave of public water utilities, beginning with the big towns, gradually spread to the country and we can safely say that, by the beginning of the 20th Century, a substantial proportion of the people in European countries enjoyed private branch connections to a supply of acceptably healthy drinking water.

The last important step was the period immediately following World War II (1939 - 1945) during which very many urban areas and industries were destroyed. During reconstruction work, the new dwellings were equipped with modern sanitary facilities and old houses were modernized under the pressure of new demands for private sanitation. In addition to these factors that greatly contributed towards a specific increase in water consumption, the use of modern water-greedy household appliances, like washing machines and dish washers, became the general practice.

In order to meet this growing demand, water utility managers were forced to undertake cost-heavy work on extensions and the renewal of their equipment, at the same time taking advantage of the tremendous progress made in techniques of water treatment, allowing deficiencies in water resources protective measures to be disguised, at least in part. Thanks to recent progress in the field of electronics and data processing, these new facilities were thus given very sophisticated remote-monitoring systems. They have attained a high degree of automation, hence very efficient management.

The above evolution is only partly applicable to the countries of Eastern Europe which, after World War II, were incorporated by force in the communist bloc. Due to the fact that they had been nationalized, the water suppliers were technologically behind Western Europe at the time of their recent switch to liberal society, in 1989.

2. Recent Developments of the Legal Framework in the Perspective of European Integration

Drinking water being considered as foodstuff, the governments of various European countries, anxious to ensure the health of their citizens, were led during the post-war period, to publish more or less stringent regulations, on the quality of the water to be delivered by water suppliers.

At first, the government authorities concerned only followed, scrupulously or otherwise, the recommendations of the World Health Organization (WHO), ie. the International Standards for Drinking Water first drafted in 1958, and completed in 1970 by specific standards for European countries (European Standards on Drinking Water).

A very important step in harmonizing legislation at European level was achieved by the creation in 1957 of the European Economic Community (EEC) which, in 1992, unites 12 countries (1) with a total population of 340 million. Since the Treaty of Rome puts all Community members under the obligation of embodying EEC Directives in domestic law, the entire population of the EEC benefits from a strict harmonized set of rules concerning the protection of water resources and the quality of drinking water.

By virtue of the agreements recently signed (early in 1992) between the EEC and the EFTA countries (European Free Trade Association) (2), common rules on drinking water will henceforth be applicable to all the inhabitants of the new "European Economic Space" (EES), representing a population of 370 million.

(1) Belgium, Denmark, France, Germany, Great Britain, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal and Spain.

(2) Austria, Finland, Iceland, Liechtenstein, Norway, Sweden and Switzerland.

3. European Union of National Association of Water Suppliers - EUREAU

In order to have a say in the drafting procedure of the Community Directive on water-related issues, the national water suppliers' associations of the 6 founding countries of the EEC (Belgium, France, Germany, Italy, Luxemburg and the Netherlands) grouped together in 1975 to form the European Union of the National Water Suppliers' Association (EUREAU).

The Union was progressively enlarged by the adhesion of the following countries: the United Kingdom (1976), Denmark (1976), Ireland (1980), Spain (1986) and Portugal (1988).
The status of full membership being exclusively reserved for EC member countries, Switzerland and Austria were admitted respectively in 1978 and 1988 as associate members.
The revision of the statutes carried out in 1991 extended full membership to countries belonging to the European Free Trade Association (EFTA), that will, together with the EC countries, form the future European Economic Space (E.E.S.).
At the present moment, EUREAU comprises the following full members:
- for the EC: Belgium, Denmark, France, Germany, Great Britain, Ireland, Italy, Luxemburg, the Netherlands, Portugal and Spain.
- for EFTA: Austria, Sweden and Switzerland.

Among EC states, only Greece is not represented, failing the existence of a Greek association.

Awaiting formal adhesion, Finland, Iceland and Norway already take part in the activities of the Commissions of EUREAU, the 2 first mentioned countries as observer members.
This same status has been granted to Hungary and Turkey, which are situated outside the EES.

The main objective of EUREAU can be defined as follows: to defend the common interests of the European water suppliers against:
- the relevant EC bodies in charge of the development of community directives in the field of water;
- the European Committee for Standardization (CEN), which has been given a mandate by the EC to work out the huge standardization programme required for the achievement of the ambitious Single Market objectives set for 1993.

The activities of EUREAU are entrusted to 3 Commissions:
EU I : "Water Resources, Treatment and Quality"
EU II : "Standardization and Certification"
EU III : "Legislation and Economics"

Matters not belonging to any of these Commissions may be treated either in Ad Hoc Groups (e.g. vocational qualification) or in joint Working Groups composed of members of several Commissions.
The management of EUREAU is in the hands of the Board of Management, assisted by the Steering Committee.
The permanent secretariat, with a Secretary General at its head, is located in Brussels (Belgium).

4. European Standardization

In 1985, the EC Commission changed its working methods with regard to community directives, adopting the "new approach" which tended to limit the contents of directives to essential requirements only, leaving details of a technical order to new European standards to set out by the European Standardization Committee (CEN). The EC Commission made the European Standardization Committee responsible for a complete new range of European Water Standards in an attempt to meet the ambitious aims of the 1993 Single Market. This programme formed the subject of a provisionary mandate in 1988, which then became a definite mandate in 1991.

By virtue of Directive 90/531/EEC on contracts of work and supplies for public utilities (water, electricity, tansportation and telecoms), published in 1988, all water suppliers in the EEC and EFTA were henceforth obliged to carry out public tendering at a European level whilst at the same time applying uniform European standards, when launching bids of any importance.

In their technical specifications, these standards had to respect the main requirements defined by a certain nomber of technical directives and, in particular, directive 89/106/EEC concerning construction materials.

With the ambitious aims of the Single Market of 1993 in mind, the EC Commission mandated the CEN in 1988, first as a temporary, then as a permanent measure to draft a complete range of new European Standards to be included in all contract Specifications for constructional work and equipment.

Right from the beginning, water suppliers were very closely associated with this new standardization which not only included standards concerning products, as in the former system, but also functional standards, a real innovation in the field. The job of working out these functional standards was entrusted first and foremost to water suppliers.

In order to be able to meet this new demand for standardization, the Technical Committee TC164 "Water Supply", was set up in 1989 as part of the CEN. A large share of those representing the European Water Suppliers took part, either as

delegates for their own standardization departments, or as representatives of EUREAU, the latter having been granted the official status of observer.

Although this vast undertaking cannot be completed before 1993, the water suppliers of the EEC and EFTA will hopefully have at their disposal, within a few years, a set of harmonized European standards for the guidance of their large-scale works, which should put them in a position to obtain the most attractive prices.

5. Water Quality

5.1 Legal Background

The EEC, caring for the health of European citizens, has promulgated a considerable number of directives since 1973, paying equal attention to both the protection and management of surface and groundwater resources, and drinking water quality requirements (see attached table). A case in point is directive 75/440/EEC on the quality required for surface waters intended for the production of drinking water, and above all, directive 80/778/EEC of 15 July 1980, concerning the quality of water for human consumption. The latter is the subject of deep thought at the moment (1992) in view of a fundamental revision.

An important step towards a more consistent policy in respect of environmental protection, including water resources, was the publication of the Single Act of 1987, in which the protection of the environment was recognized as being an inseperable part of Community policy.

Unfortunately, the effects of this new policy have not yet been sufficiently felt in terms of day-to-day worries of water suppliers, confronted at present with the following conflicting situation:

On the one hand, in Directive 80/778/EEC, the EEC has taken a series of very strict measures concerning maximum concentrations of substances, such as pesticides, likely to be found in drinking water, thus causing very irksome problems for a number of water suppliers. On the other hand, the directives concerning the protection of water resources have not been treated with the same stringency, which means that the water suppliers are finding it increasingly difficult to produce good-quality drinking water because the water resources are insufficiently protected.

The principal demand of the European water suppliers is that the EEC adopt a more stringent policy towards the protection of resources supplying water supposedly suitable for human consumption.

They express the hope that the joint statement of EEC Environmental Ministers, issued at the Hague in November 1991 for the purpose of establishing a sustained Community policy based on the ecological principles governing the integral management of all water resources in the Community, will serve as an instrument with which to achieve this objective.

5.2. Main Causes of Current Pollution in Water Resources

Since water, like the air and the soil, is an integral part of the natural environment, the problem of water quality is highly dependent on the health of the environment in general. But we are today forced to admit that the environment is suffering from the damaging effects of the industrial and agricultural revolution which has taken place at an exaggerated speed, especially in Western Europe, during the period following World War II. Never, throughout history, has the European economy undergone such radical change as in the last few decades, resulting in a consumer society with an exceptionally high standard of living. The farming world has had to adapt to that evolution in turn by proceeding with fundamental changes in its ancestral culture and practices. Only in the last few years have the relevant European authorities begun to realize that this lightning economic growth has been reached only at the cost of on-going spoliation in the natural environment.

The occuring pollutions may have either a point or a diffuse origin.

Among the chief polluters belonging to the first category, industrial plants rank first, especially those engaged in the production of chemicals or those using chemical products in their manufactoring processes and, to a lesser extent, the users of these chemicals: commercial companies, workshops and the smaller firms, without forgetting private households.

Even if some of the big chemical plants are known willfully or accidentally to discharge considerable quantities of dangerous products in waterways or under the ground, these pollutions, because they occur at a precise spot, can be subjected to regulations which can be controlled. There are already some directives in this area, notably directive 76/464/EC concerning the discharge of dangerous substances in the natural environment.
Finally let us not forget to mention that local pollutions can also be caused by former industrial refuse dumps, by non water-tight servage pipes or by accidents involving vehicles carrying harmful substances.

The diffuse types of pollution are almost exclusively due to agricultural pollutants. Over the last few decades European agriculture has had to abandon its traditional methods in favour of intensive farming because of economic constraints and governmental and community authorities.

Intensive farming is characterized by a concentration of cattle stocks and by methods of monocultures with high efficiency yields obtained by using massive amounts of organic and mineral fertilizers combined with ever increasing herbicides and pesticides.

This modern agriculture is the basis of increased contamination of water resources and, at the present time, poses serious problems for water distributors, in particular with regard to the amount of pesticides used, such as atrazine, and nitrates.

Pollution due to pesticides is felt to a varying extent, depending on whether it effects surface water or groundwaters. Whereas, in groundwater, concentrations of pesticides are usually weaker and rarely undergo sudden change, the situation as regards rivers is different since sudden peaks can occur during heavy rainfalls after a period of drought.

Due to their massive presence in waterways, these pesticides represent a real problem for water suppliers in countries such as Germany, France, Great Britain, Switzerland, the Netherlands, Italy etc.

With regards to the nitrate-related problems in aquifers, it is to be remarked that the true cause of this worrying situation is the spreading of too much liquid manure, a new form of animal fertilizer replacing traditional farm waste such as the liquid from urine sumps and manure from muck heaps, during seasons when there is practically no demand for fertilizers.

This danger is particularly pronounced in maize-growing areas, a cereal generally cultivated on sandy soil which is also favourable to the production of drinking water.

It was after the large-scale introduction of this crop, hitherto unknown in Europe, that most European countries noticed a strong increase in the nitrate concentrations in groundwater. In some parts, values are in excess of the admissible concentrations laid down by EEC Directive 80/778/EEC on drinking water quality. Several countries have even had to ask for temporary derogations, as provided by European legislation, to avoid being forced to deprive whole regions of their water supply.

5.3 The Search for Remedies

To repair this alarming situation, two diametrically opposite approaches are feasible:

We can take advantage of recent advances in water treatment capable of removing the harmful substances from the raw water.

Pesticides are a case in point. Concentrations of the latter in modern treatment plants can, until levels up to 1 to 1.5 µg/l, be reduced to values which comply with Directive 80/778/EEC (0.1 µg/l per individual pesticide and 0.5 µg/l for the total amount of pesticides). This can be done by adding an extra filtration stage on activated carbon, completed by oxidation with hydrogen peroxide or ozone. For nitrates, the concentration can likewise be reduced to within the authorized limit of 50 mg/l, by central denitrification facilities based on ion exchangers, as is currently performed in some parts of the United Kingdom, or by biological procedures such as those used in France, Germany and elsewhere.

Two points must, however be stressed. Firstly these sophisticated treatments are only feasible in relatively large water works and the average water supplier is not, therefore, in a position to cope. Secondly the disposal of treatment waste (eg. activated carbon regeneration in the case of pesticides), is likely to give rise to new problems of environmental protection.

Moreover, it must not be forgotten that this approach is in total contradiction with the "Polluter pays" principle. In the end, it is the consumer of the drinking water who, through increased water rates, effectively bears the cost of the pollution occurring upstream of the water cycle. The real polluter comes out unscathed.

Even if, at the present time, a cerain number of water suppliers have had to resort to these sophisticated treatment methods in order to satisfy the requirements of Directive 80/778/EEC, such measures can only be regarded as temporary.

European water suppliers are of the opinion that the problem of water quality would be best solved by stricter Community regulations on the discharge of harmful substances in natural water systems. Even if a series of directives to this effect has already been promulgated by the EEC (discharge of dangerous matter in the natural environment in 1976 and the "nitrates" directive on the spreading of animal muck in aquifer-dependent areas in 1991), they consider that these measures are still not enough. And furthermore they have made no significant contribution towards an improvment in the quality of water resources until now. In particular, they have not enabled the thorny problem of pesticides in river water used for human consumption, to be solved satisfactorily.

As far as the "nitrates" Directive published in 1991 is concerned, it is to be remarked that it unfortunately only imposes restrictions on animal manure, without taking the effects of inorganic fertilizers into account. We must therefore wait to see how it is embodied in the respective domestic legislations in the EEC end EFTA countries, reinforced by a code of good

agricultural practices, before we are able to give a definite opinion on the efficiency of the measure as a whole.

To sum the matter up, it must be clearly stated that, in the interest of water supplies in particular and of the ecology in general, the important point is for the EEC to adopt more stringent measures at Community level for the protection of water resources and oppose with all the means in its power any form of pollution whatsoever, whether industrial, agricultural or household, likely to occur at some stage or other in the natural water cycle.

In the field of agricultural pollution, it is important to point again at modern agriculture, in its so-called intensive form, as being very largely responsible for the deterioration of drinking water in most European countries. Bearing in mind that this policy has also led us to complete economic stalemate, since it is not even capable of securing a decent living for most of the smaller farms, an overall reform of the agricultural policy in the Community is becoming increasingly urgent. The new agricultural policy ought to consist of giving up today's intensive methods in favour of "extensive" farming, applying more environment-friendly cropping practices. A sustainable improvment of the quality of water resources can only be obtained in this way.

6. The Quantitative Approach

The population of antique Rome had at their disposal enough water for the consumption of about 600 litres per capita per day.
After the destruction or abandon of the old aqueducts, the people of the Middle Ages and subsequent periods until the 19th Century, did not enjoy the benefit of individual branch connections. They drew their water from public fountains or rivers, in jugs or buckets, which limited their daily consumption to about ten litres or so a head.

It was only a result of industrialization at the end of the 19th Century, and the ensuing development of public water utilities, that private water supplies were laid on as a general practice in the great urban centres. The progress made in personal hygiene, thanks to running water in people's homes, followed by the general installation of private bathrooms and flushing systems, was to bring consumption rates at the beginning of the 20th Century up to about 100 l/per capita/day. Nowadays figures are between 100 and 200 l/per capita/day with a weighted average in the region of 150 l/per capita/day. The only country that does not follow this rule is Switzerland, with a daily consumption of about 300 l/day per inhabitant.

During recent years, the specific need per inhabitant has been seen to level off, or even show a slight decline in most European countries. This trend, which seems to be spreading, is probably the result of public awareness

campaigns conducted in many countries, inciting the consumer to moderate his or her consumption of drinking water, including recommendations to avoid waste, by using water-saving household appliances and sanitary equipment, among other things.

The total need for water also appears to be stationary, or even slightly on the decline, because of the general stagnation of the birth-rate in European countries.

As far as industrial consumption is concerned that too has tended to be stagnant or even on the decline over the last few years. This is due to the fact that industries are recycling water more and more, now that it is increasing in price.

And so the problems which European countries must cope with in the coming years do not involve increasing the available supplies, but rather in safeguarding present resources against the growing threat of pollution.
The exceptional specific consumptions reached at the beginning of the Christian era in antique Rome will remain an isolated historical fact in the history of European water supply.

7. The Price of Water

The price of water varies a great deal from one country to another, and even between regions in the same country. The expenses affecting the cost price of water depend to a great extent on the nature of water resources, their location in relation to the consumers, as well as their degree of contamination. Hence some of the large cities, like Rome in Italy, and Munich in Germany, enjoy attractive prices due to the fact that they use only slightly polluted groundwater resources (less treatment needed) which can be brought to the consumer by natural gravity (no pumping costs).

On the opposite, towns which have to transport water over long distances and are obliged to use costly treatment methods for the removal of unwanted substances, such as pesticides or nitrates, are forced to charge their subscrivers a much higher price.

When it comes to scantly populated areas in rough hilly country, production and transportation costs can be very heavy. In such cases, the prices are often brought to a more acceptable level through state subsidies, both for the initial installation and current operating costs.

A comparative study performed in 1987 among 15 European countries by the Standing Committee on "Water Statistics and Economics" of the International Water Supply Association (IWSA), shows that the average price of water in the

different countries can vary by as much as 4 times ($0.23/m3 in Hungary as against $.99/m3 in Germany). The same surve also brings evidence that the price in one of two comparable towns in the same country can be more than twice that of the other: (eg. in Germany the price is: Munich 1.15 DM/m3; Frankfurt 2.15 DM/m3).

However, it must be pointed out that the proportionate cost of water in the overall European household budget is about 0.3% to 1.0%. These very moderate expenses, even in the least favourable cases, are not likely to incite the consumer to reduce his or her individual consumption to save money.

As for the future of water prices, it is important to stress the fact that the growing pollution of natural resources, both groundwater and surface water, will probably cause the charges weighing on the cost price of water to rise significantly in the coming decades, often at a much faster pace than the normal increase in people's incomes. The growing demands in respect of drinking water quality, enforced by Community legislation, will further magnify this tendency.

With regard to pricing, it is of note that in the past the custom in the majority of cases was to charge the same price per cubic metre of water, whatever the amount consumed. Recently experiments have been made in countries such as Italy, on a sliding scale system, beginning with a very low basic price for vital necessities, and progressively higher rates for the quantities above this minimum. In addition to the fact that this measure was first introduced for reasons of social justice, it should be remarked that the more recent objective is to encourage people to make more sparing use of drinking water.
At the moment, no definite conclusions can be drawn regarding this new approach.

Concerning the price of water for industrial consumers, we note that they generally get the benefit of cheaper rates compared with private subscribers which is justified by the fact that the increased quantities consumed by the industry lead to cheaper distribution costs per m3. The price structure is different to household prices as it very often includes an initial fixed slice, at a relatively high rate to meet the water suppliers' fixed charges. A second slice, proportionate to the volume of water consumed, is designed to cover direct operating costs.

It is also worth mentioning that following the effect of rising prices in recent times, and the prospects of future increases, a number of industrial customers, namely those who use drinking water on a large-scale in their industrial processes, are prompted to revise the whole concept of water procurement, either replacing potable water by a less valuable quality, or

recovering the total amount of the water consumed through recycling methods.

Lastly, it should not be forgotten that the cost of treating waste water is often recouped by the water supplier on the basis of the quantities recorded on the water meters, even if these takings are ultimately transferred to the department in charge of effluent treatment.

8. Miscellaneous Aspects

8.1 Nature of Water Resources

Water resources harnessed for the production of drinking water may be groundwater (natural springs or aquifers) or surface water (lakes, rivers). It is difficult to establish a rule concerning the proportions in which these two types of resources are used in different countries. Local hydrogeological factors are more inclined to be the determining factor.

Some European countries like Great Britain, Sweden, Spain and Finland, use a majority of surface water. Others, like Denmark and Austria, draw their supplies almost exclusively from groundwater.

In two neighbouring countries for example with similar climatic and geological conditions, such as Austria and Switzerland, we find that the latter uses a relatively high proportion of surface water while the amount used by the former is insignificant.

It can, however, be confirmed that according to an evaluation recently carried out among EEC countries, Europeans on the whole, draw 2/3 of their water supplies from groundwater and 1/3 from surface water.

8.2. Breakdown of Water Consumption

Statistics usually differentiate household and industrial consumption. Small workshops and shopping centres are often included in the industrial category.

Without being able to establish a general rule concerning the breakdown between these two consumer categories, it can be safely stated that in all countries household consumption accounts for over 50% of the total, respresenting on the whole about 2/3 of the total output.

8.3. Extent of Supply

Owing to the generalized development of public water utilities and the

financial effort so often granted by government bodies, 100% of the population is supplied with running water in most of the countries in Western Europe.

There are only a few countries where the level is slightly inferior, but nowhere is it below 80%.

Thanks to this privileged situation, we can safely say that waterborne diseases in Europe, such as cholera and typhus, are almost a thing of the past.

8.4. Funding the Investments

It is superfluous to say that the heavy investment made since the second half of the 19th Century have been partly financed out of public funds, in the aim of improving public hygiene.

The subsidized part of the works has varied from one country to another and was doubtless higher in regions of an essentially rural character than in urban districts.

Today, the public authorities tend to steer clear of new investments, especially for the benefit of the big conurbations, judging that the water utilities are quite capable of finding the necessary funds by themselves. While these funds can be obtained on the private market, it is also possible to apply for more favourable interest rates, under certain conditions, to the European Development Fund (EDF), managed by the European Investment Bank (EIB) under EEC mandate.

A significant number of projects thus have been financed in some of the EEC member states. They are placed under the control of experienced EIB staff, within the scope of very precise development and housing programmes which comply with the critera of economic, financial and technical sustainability.

9. Administrative Organization

In European countries, water supply was considered at the outset to be the responsability of the local authorities (cities, municipalities). It was one of the services that local government was supposed to supply to the population. Towards the end of the 19th Century, under the impetus of nascent industrialization, when a great number of townships began to find it both financially and technically difficult to fulfil this obligation, legislation in several Western European countries was amended to allow municipalities and towns to associate to provide this service between them. These new associations, known as inter-communal water boards, developed quickly, and

still enjoy some popularity today. One of the German associations is a good example. It is responsible for supplying water from Lake Constance to Stuttgart (Zweckverband Bodensee-Wasserversorgung).

As regard the legal status of such associations in Europe, it is important to point out that in modern times water utilities, being under the authority of local government, were automatically a part of the municipal and communal utilities. They were often jointly managed with the gas utility.

Because of the growing complexity of the problems inherent in water supply, the obligation of being able to cope with excessive development and increasingly sophisticated technologies, water supply networks in the great European cities are very often released from the straight-jacket of municipal organization and entrusted to companies with private status, even if all or the majority of the capital is owned by local government.

In some countries, municipal or inter-communal water boards resort to the possibility of placing their facilities under the management of specialized private companies, more capable of adapting to technological evolution and raising the funds needed for building new equipment. By concluding leasehold operator contracts with private companies, the local authority can continue to control major policy issues, such as the pricing of the water, and remain the owner of the structures. Thanks to this arrangement they feel in a better position to give their fellow citizens high quality service. These leasehold contracts can have a variety of forms and conditions. They are particularly popular in France and, to a lesser extent, in Spain and Italy.

It is to be noted here that the United Kingdom, following a change in domestic legislation, has recently privatized publicly-owned water utilities. In the minds of the legal experts, this should enable them to obtain the indispensable loans required for modernizing plant and equipment, as well as the considerable investments needed as a result of water resource deterioration.

As far as Eastern European countries are concerned, the original utilities belonging to communal organizations were nationalized as they fell under communist rule. Since the return to freedom in 1989, certain of these countries are again turning to communal organization or inter-communal water boards, based on the West European model.

10. Prospects for the Future

Europe, as already mentioned, has experienced fantastic development since World War II (1945), changing its industrial and economic structures and the life style of the people from top to bottom.

Whereas this beneficial evolution has given the population as a whole access to an unprecedented standard of living, it must be admitted that this progress has, unhappily, been achieved at the expense of the environment. After thousands of years, never in the history of human kind has the age-old natural cycle of water, soil and air been so profoundly disturbed as during the last few decades.

The overall situation concerning pollution is likely to get worse during the coming years following the opening of the Single Market in 1993, leading progressively to the free circulation of goods and people in the European economic space (EES), formed by the EEC and EFTA countries, plus the gradual incorporation of the Eastern countries.

At the present time, it is still difficult to foretell what consequences this change will entail, added to the ecological threats on a global scale and a radical change in the earth's climate which can, as certain people repeatedly declare, lead the entire planet to ecological disaster.

Be that as it may, European public opinion is beginning to realize the seriousness of the situation and a large part of the population seems to be prepared to accept certain restrictions on living conditions and behaviour in favour of the environment.

As for the water suppliers, they are also fully aware that it is not enough to fight exclusively for the protection of their share of the water resources used for human comsumption, but that overall protection of the environment is now a dire neccesity.

Through their efforts in favour of greater protection for water resources, water suppliers will play an immensely useful role in the struggle for environmental conservation, which is vital for the survival of the human race.

Perhaps we still have time to change our course. Maybe it is not impossible that a more reasonable environmental policy could avoid jeopardizing the future of generations to come and stop our headlong rush to global disaster.

I will thus conclude by a quotation displayed on an official poster at the recent IWSA Congress in Copenhagen in May 1991. It is a proverb of the Massaï people, which is a wandering tribe in Africa living in very modest conditions, and it says:

"The World was not bequeathed to us by our parents, but rather entrustred to us by our children".

KEYNOTE ADDRESS III

The North American Perspective

by

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North American Perspective

Frederick H. Elwell

These are interesting and challenging times for water suppliers, consultants, and regulators in North America. We are seeing in the United States and in Canada a great deal of interest and effort being made in the drinking water industry in both its regulations and its management techniques. There are challenges and new directions before us, and the industry is responding. What is driving these changes?

The legislative-regulatory environment has become increasingly complex and confusing. Drinking water is becoming more of a political rather than a technical issue. This is largely due to activities of the environmental organizations and the strong support that they receive from legislators, as well as from the press and television. Many of the issues that have been presented in an alarming manner have been the cause of legislative and then regulatory acts. After that has occurred, it has often been found that the issues and the problems were not as critical as perceived, but the actions on stringent regulations had already taken place.

A second reason for the new challenges and the new directions is that consumers want more input into water quality/quantity decisions being made by governmental agencies or utilities. Siting of facilities, developing additional water supply, dealing with needs or treatment in order to meet regulatory standards - these issues are becoming a greater concern to the general public and water consumer, and more consumers and groups of consumers want to be involved in the decision process.

Another reason for new directions is the change of viewpoint of consumers, regulators, and environmentalists. We have, in our regulatory emphasis, moved away from preventing short-term health effects to preventing potential lifetime effects from chemicals whose actions on the body are not well understood.

Finally, the fourth issue before us is that the economics of providing quantities of safe drinking water are becoming a paramount factor due to the increasing costs of source development and protection, monitoring, treatment, and waste disposal. These overriding issues, although the industry has talked about them for a long period of time, have just now begun to reach the general public and make them more concerned about what is happening and what we do. It appears that the water supply profession in the U.S. is forging new directions to find solutions to the challenges stated above in three critical areas: public policy, technical developments, and social issues. Before discussing in some detail what the solutions are or what these new directions are, we do need to spend time understanding the legislative regulatory environment and how that has in fact brought about change.

First, understand that issues that occur in the United States in the legislative and regulative arena have an impact on those that occur in Canada, and vice versa. The continued debate over the standard for the trihalomethanes and the driving force in Canada to lower standards below the U.S. standard is just one example of the interaction between the provinces in Canada and the United States. The Safe Drinking Water Act is the primary legislative impact decision in the U.S. and a number of provinces are developing similar legislation in Canada.

Regulations have been around since 1789 to prevent communicable disease. However, most of those efforts early on through the 1970s dealt a great deal with turbidity and microbiological concerns with heavy metals. The Drinking Water Act was enacted in 1974, giving the Environmental Protection Agency (EPA) broad authority to establish and enforce drinking water quality standards. The states are primarily responsible for the actual day-to-day implementation of the Safe Drinking Water Act and attendant regulations. It

was only after 1974 that issues of synthetic organic chemicals and filtration concerns became significant for legislation and regulatory efforts.

Major impact came with the Safe Drinking Water Act amendments in 1986. These amendments were due to congressional impatience with EPA's regulation development and with the concern about large-scale contamination of shallow groundwater formations. Safe Drinking Water Act regulations cover four basic contaminant groups--microbiological, inorganic chemicals, organic chemicals, and radionuclides.

Eighty-three contaminants were specifically listed in the 1986 amendment of the Safe Drinking Water Act for regulation. These are now mostly in place. EPA is additionally required to add 25 new contaminants every three years even though health effects and occurrence data are scarce and analytical techniques, questionable. In 1974, there were 22 contaminants that were regulated. By the year 2000, over 200 contaminants will be regulated. We'll look briefly at some of these contaminants by category: first, microbiological. In North America the coliform organism is still used as the indicator of bacterial contamination. New regulations, however, emphasize protozoans and viruses for which coliforms are not a good indicator. Because of this, a treatment technique (filtration/disinfection) is required for surface water systems. The regulation is based on disinfection effectiveness (i.e., contact- time values). The Safe Drinking Water Act also requires disinfection of groundwater sources and further requires filtration of groundwaters under the influence of the surface waters.

Inorganic chemicals include the traditional constituents such as arsenic, chromium, and nitrates. Also included is asbestos, which is difficult and expensive to monitor. The corrosion by-products, lead and copper, are also regulated. The lead and copper

regulations are based on corrosion control as a treatment technique rather than a quality limit. And they also require and provide for consumers taking their own samples. Systems exceeding the lead and copper levels must, in addition to practicing corrosion control, implement extensive public education programs to inform consumers how to lower their exposure to lead. Along with the surface water treatment rule, this is possibly one of the areas of most concern for water utilities in the United States.

Organic chemicals account for nearly all the regulated contaminants. Primarily included at this time are industrial solvents and pesticides. Also included are the disinfection by-products (DBPs). The disinfection by-product rule, which is coming at this tim, affects every water supply since disinfection is required. The DBPs regulation will present design and treatment challenges since microbial control (short-term disease implications) must be balanced with production of DBPs (potential long-term health effect). There are implications for wastewater treatment as well due to discharges to water supply sources. For the first time in the drinking water program, regulatory negotiation will be included in establishing the standards of water disinfection by-products. The disinfection by-products will include more than trihalomethanes. The halocedic acids, chloralhydrate, bromate, chlorine, chloramines, chlorine dioxide, chlorate, and chlorite will now be part of the disinfection by-products standards.

Radionuclides are included and are presently in the development stage regarding drinking water standards. The critical issue is radon. The EPA considers it a larger health threat than all the other chemical contaminants combined. Radon is an inhalation problem rather than ingestion since it is a gas. Drinking water contributes a small percentage to the total radon exposure. Most is due to radon entering from the subsoil. One of the major concerns here is the significant cost of compliance to areas that are generally served by small water systems.

The American Water Works Association (AWWA) estimates that 32,000 community water systems will be in violation of the proposed regulation. This represents over half of the water supplies in the community water systems in the United States. The greatest percentage of violators will be the small systems, that is, those serving populations of 3,300 or less. Therefore, the cost of treatment is going to be high, and there is some question whether the benefit of that treatment is as significant as EPA is indicating.

We can now see that the significant issues that have occurred over the last six years, in particular, and will continue to change how we look at drinking water in the United States, have had some major impacts in the water utility industry. And how is that industry responding? First, public policy is changing. The utilities and the consumers are looking more at balancing between health risk and costs. Is public health risk actually being reduced in proportion to increasing costs? Should the consumer bare the costs of the regulatory program through surcharges on water rates? The bulk of the regulatory problem rests with water systems serving less than 3,000 people. That presently is 90% of the violations. These systems also have the least ability to finance the needed improvements. This will force regionalization of and even takeovers of numerous systems. In some states there are mandates for larger systems taking over smaller water systems. And control will become more and more important in order to protect watersheds and aquifers. What the industry has been saying for years is beginning to take effect. The most important thing that you can do and the least expensive thing that you can do in protecting drinking water quality is to protect the water supply at its source.

Additional dangers are coming forward due to the impact of regulations and consumer interest in drinking water quality. There is conflict between regulations. Probably the best example is the requirement for disinfection and the control of disinfection by-products.

What gets sacrificed? The concerns regarding long-term health effects or the concerns about the contamination of water supplies?

There are issues surrounding waste disposal. How should we dispose of contaminants removed in light of restrictions on air pollution and land disposal? In the United States more than in Canada, considerations are not being given for these concerns as drinking water quality limits have been set.

The progress of analytical technology presents another issue. As techniques get better to determine contaminant levels in drinking water, there will be a great temptation to lower standards. This will mean constant retrofitting of treatment processes and skyrocketing costs.

Social issues center on the general movement of the water utility industry and management to new directions in public information and public education. Water suppliers must be more effective in communicating issues to the public. The "silence service" attitude has to end, and I believe it is ending.

The public must be involved in the upcoming policy decisions on developing water reuse and water supply issues. The reason that the public must be involved is that these changes will affect the nature of the cost of drinking water. We must hear the public views on the issue of how safe drinking water should be and what the needs are for new supplies to be developed in the future.

Clearly, legislative and regulatory development impacting drinking water is going to continue in an accelerated pace and is going to drive much of the change.

The changes that are coming present challenges but also opportunities. The water supply profession must take an active role in demonstrating leadership in public policy, technical areas, and social fronts.

Finally, what is happening in the United States and Canada is or soon will be happening in other parts of the world. We must all work together in sharing technologies, research and development, and solutions. It must move forward cooperatively. We have the same responsibility and the same commitment to the people we serve. Drinking water of unquestionable quality.