

INITIATIVES: The A/C Pipe and Health Program
and the Aggressive Waters Program.

by

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It should be obvious that we are running somewhat behind schedule today, so I'm going to abbreviate my comments in this the "asbestos in drinking water" section of the program. I would also like to effect the important transition between "issue" and "initiative."

The A/C Pipe and Health Program, you may recall, was conceived out of the need to transfer the accountability of "firefighting" the health issue from AACPP Staff to a knowledgeable cadre of corporate specialists.

The rationale behind this shift was and still is the freeing up of Staff to address the source of the problems, that is, the regulatory agencies. Secondly, it would raise the level of problem solving competence and confidence at the sales engineer level by giving them an integrated, off the shelf education package.

In accordance with the Three Year Operational Plan, Staff updated the A/C Pipe and Health audio-visual program to be more responsive to the "state of the art," if you will, on the ingested asbestos question, and in particular, the EPA/Kanarek study. Most of the changes in the program will be obvious to you -- we have added slides to make it move at a better pace and at a higher interest level. Rather than discuss it, I am going to run it. This too, like the contractors' package on recommended work practices, will be further critiqued at the Market Development and Technical Committee Meetings.

- Showing of A/C Pipe and Drinking Water presentation -

Your reception of this presentation is generally the one which is given by water utilities, city councils and others. In my judgement, it has been the single most effective tool that the A/C pipe industry, through the Association, ever has produced.

As we did last year, Staff has contacted all the American Waterworks

Association sections to request program time to make the "A/C Pipe and Health" presentation at the sectional meetings. In the balance of 1979, we will be participating in the sectional meetings of Puerto Rico, the Atlantic Canada section in Newfoundland, South Dakota, the Western Canada Water and Sewage Conference, and the joint Southwest-Texas section meeting in Dallas.

Feedback on the "A/C Pipe and Health" presentation continues to be very positive and I would like to think that some of the benefits we are beginning to reap with respect to the state water regulatory authorities is a result of the efficacy of this program and the efforts which the member companies are applying to it.

Aggressive Waters Program

The famous historian Edward Gibbon was the first individual to popularize theories about the potential health and economic impacts of corrosive or aggressive drinking waters. Gibbon hypothesized that the decline and eventual fall of the Roman Empire may have been due to the leaching and ingestion of lead used in the water pipes of that civilization's drinking water system.

For a problem that has been around since Roman times, there is surprisingly little scientific data, definitive data, on the health effects, scope and economic impact of corrosive waters.

As far as the A/C pipe industry is concerned, there is only one problem with corrosive waters and that problem is that it attacks our product and may release asbestos fibers into the drinking water conveyed through it. That is enough. If the industry has learned anything in recent years, it is that the regulators' tolerance level for carcinogens in drinking water is decreasing, not increasing. That leaves us, as an industry, with the singular hope of avoiding regulation resting on negative results in animal feeding studies... a prospect which preliminarily looks more optimistic than originally thought,

but one which would not necessarily get us "off the regulatory hook" in the long run.

Therefore, in the "by your own bootstraps" category, there are two available options to avoid regulation of A/C pipe. Number one, make technical modifications to the product to eliminate fiber release, and number two, convince the Environmental Protection Agency and similar water regulatory authorities throughout the world to include a numerical standard for corrosivity in enforceable drinking water regulations. The Association and its members are pursuing both of these options and the Aggressive Water Program is the one which will first reach fruition.

Shortly after the 1978 Annual Meeting, AACPP retained Midwest Research Institute (MRI) to conduct a comprehensive study to determine the extent to which consumers in the United States were exposed to drinking water of a corrosive nature, to assess the potential health effects of those corrosive waters (including the asbestos related health effects) and to estimate the economic impact of those waters in the utilities distributing them. This 8 month study is now complete. It can be said with the highest degree of reliability that MRI has produced the definitive research document on the impact of corrosive waters in the United States.

As a reference point, let us take a quick look at what was known prior to this date. In 1976, for example, Hudson and Gilcreas published a controversial article in the AWWA Journal which estimated the national costs of internal corrosion at approximately \$1 billion per year. These estimates often are quoted with considerable literary license, which is, in and of itself, poetic justice because the figures make use of relatively little firm data. It just simply was not available.

More recently, Jim Millette of the Environmental Protection Agency, Municipal Environmental Research Laboratory, conducted a study based on a

sample of 35 geographically distributed areas. Water utilities were randomly selected within each of those 35 areas; the total sample was about 130 utilities serving 40 million people. Based on this sample Millette found the following distribution of utilities by Aggressive Index (Table 1). You can see that non-aggressive waters are about 31.5% of the total, moderately aggressive less than 52% and highly aggressive 16.5%. Remember these figures, you are going to see them later. The et al in this study should be John Welch and the A/C Pipe Producers Association, since it was my idea for EPA to tap this data bank. This was a very spontaneous recommendation, but it may add a considerable amount of credibility and support to the research I am going to discuss later.

The MRI study was designed to supply relevant national information in three main areas: health effects, amount of aggressive water and its economic impacts. Most of you are aware that low mineral content or "soft" waters are corrosive to the pipes that transport them and to the tanks that store them; they also are corrosive to metering equipment, valves, consumers' home plumbing, appliances and a number of other things. This corrosive action may release a number of potentially toxic heavy metals, including zinc from galvanized pipe, cadmium from soldering compounds and also from galvanized pipe, and lead from customer service connections or poured joints. (Table 2). Not listed there, but often quoted in the same breath with corrosive waters is the release of polyaromatic hydrocarbons (PAH's) from organic linings and vinyl chloride monomer and plasticizers from plastic pipe. However, the presence of these materials in drinking water is unrelated to corrosivity; it is simply related to the presence of water inside the pipe.

Beyond the potential toxicity of these contaminants, there is increasing evidence that the hardness or softness of drinking water may play a very

TABLE 1

<u>Character of Water Distributed</u>	<u>Portion of Utilities Millet et al 1979</u>
Highly aggressive water (AI less than 10.0; LSI less than -2.0)	16.5%
Moderately aggressive water (10 AI 12; -2.0 LSI 0.0)	52.0%
Nonaggressive water (AI greater than 12.0; LSI greater than 0.0)	31.5%

TABLE 2

OTHER TRACE ELEMENTS IN DRINKING WATER WITH POSSIBLE HEALTH EFFECTS

<u>Element</u>	<u>Range (ug/l)</u>	<u>Average (ug/l)</u>
Barium	2-340	43
Beryllium	0.01-1.22	0.19
Cadmium	1-120	9.5
Chromium	1-112	9.7
Cobalt	1-48	17
Copper	20-860	40
Lead	2-140	23
Manganese	0.3-3,230	59
Mercury	0-2	None
Molybdenum	2-1,500	68
Nickel	1-130	19
Silver	0.1-38	2.6
Vanadium	2-300	40
Zinc	2-1,183	64

Note: Adapted from National Academy of Sciences, 1977.

TABLE 3

EPIDEMIOLOGY STUDIES DEMONSTRATING HIGHER DEATH RATE
IN AREAS WITH CORROSIVE, "SOFT" FINISHED
PUBLIC DRINKING WATER

<u>Geographical Unit</u> <u>Studied</u>	<u>Arteriosclerotic Heart Disease</u> <u>(Positive Correlation with</u> <u>Corrosive Drinking Water</u>	<u>Author, Year of</u> <u>Publication</u>
USA by state	Positive; $p = 0.01$	Schroeder, 1960
USA, cities	Positive; $p = 0.01$	Schroeder, 1960
USA by state	Positive; $p < 0.01$	Schroeder, 1966
USA, cities	Positive; $p < 0.01$	Schroeder, 1966
USA, "economic areas"	Positive; $p = 0.01$	Sauer, 1970
UK, County boroughs	Positive; $p = 0.01$	Morris, 1961
UK, County boroughs	Positive; $p < 0.01$	Crawford, 1968
Sweden, towns	Positive but $p > 0.05$	Biorck, 1965
Ireland, urban areas	Positive but $p > 0.05$	Mulcahy, 1966
Canada, provinces	Positive; $p = 0.05$ (CVA only)	Neri et al., 1972
Canada, municipalities	Positive; $p = 0.05$ (CVA only)	Neri, et al., 1972
USA, Oklahoma counties	No correlation	Lindeman, 1964
USA, Colorado counties	Positive but $p \geq 0.5$	Morton, 1971
Japan	Positive	Kobayashi, 1957 (Anal. by Schroeder, 1961)

important role in the incidence of cardiovascular disease, that is heart attacks and strokes. In spite of all the media that the asbestos industry has been able to garner, heart disease still remains the United States' number one killer.

It is apparent from 49 studies in 9 countries (Table 3), even the poorly controlled studies, that there is a health benefit to man from the long term use of water which is not soft or corrosive. The benefit most often cited relates to reduced cardiovascular disease. The available data do not answer, however, whether the corrosive water is itself chronically toxic, that is, leaching cardiotoxicants from contact with materials or whether the corrosive water lacks a necessary element for cardiovascular health that is poorly available from dietary sources.

It also is possible that a protective effect occurs with mineral rich hard water that is absent from areas with mineral poor or corrosive water. This may be reflected by a greater incidence of mortality in the absence of the protective factor. While reviews on these studies cannot agree on which elements are the most likely to be involved in health effects, it was MRI's conclusion, and certainly one with which the Association agrees, that there is little point in hypothesizing mechanistic conclusions at this point in time. If you just look at these data (Table 3) the amount and the consistency of the available data strongly supports the need for mandatory stabilization of corrosive waters. How persuasively AACPP documents and pleads the health effects case will in large measure determine the outcome of this program. This is simply because health effects drive regulation ... always.

Moving on to the scope of aggressive waters, MRI conducted a national survey of all water utilities serving 50,000 or more population. Similarly, a sample of utilities in the group serving between 10,000 and 50,000 people also were contacted.

These utilities were requested to provide information on their size, the character of the water distributed, treatment processes used, the nature of the distribution system, as well as various cost data. In all, over 1,000 utilities were contacted, roughly 500 in each of these size groups. The response rates ranged up as high as 48%. The response rate, as expected, was smaller for the smaller utilities primarily because they are just not sophisticated enough to collect data or they just do not have it. Because of the poor response rate in the smaller utilities, an analysis of the results for the small utilities was not made

The utilities for which information was obtained serve over 93% of the population in the utility size group studied. That group constitutes about 103 million water consumers in the United States.

Here is a histogram (Table 4) of the response rate by utility size. It was anticipated that the smaller utilities would not respond as well as the larger utilities and of course that shows on the left hand side of the chart. The very largest utilities, where the response rate also dropped off, probably did not respond because of the greater complexity of their systems and the larger effort involved in collating and providing data to MRI.

This next slide (Table 5) shows the breakdown of the utilities by water aggressiveness.

What's really interesting about these data, as you will see in the next slide, (Table 6) is the similarity to Millette's work. Look at this comparison, side by side, of the Millette study and the MRI research; two completely different studies, two completely different sampling methodologies, but look at the incredible similarity in the results. It's almost unbelievable. The suggestion by Association staff that EPA pull these (Millette) data from the computer probably was a very

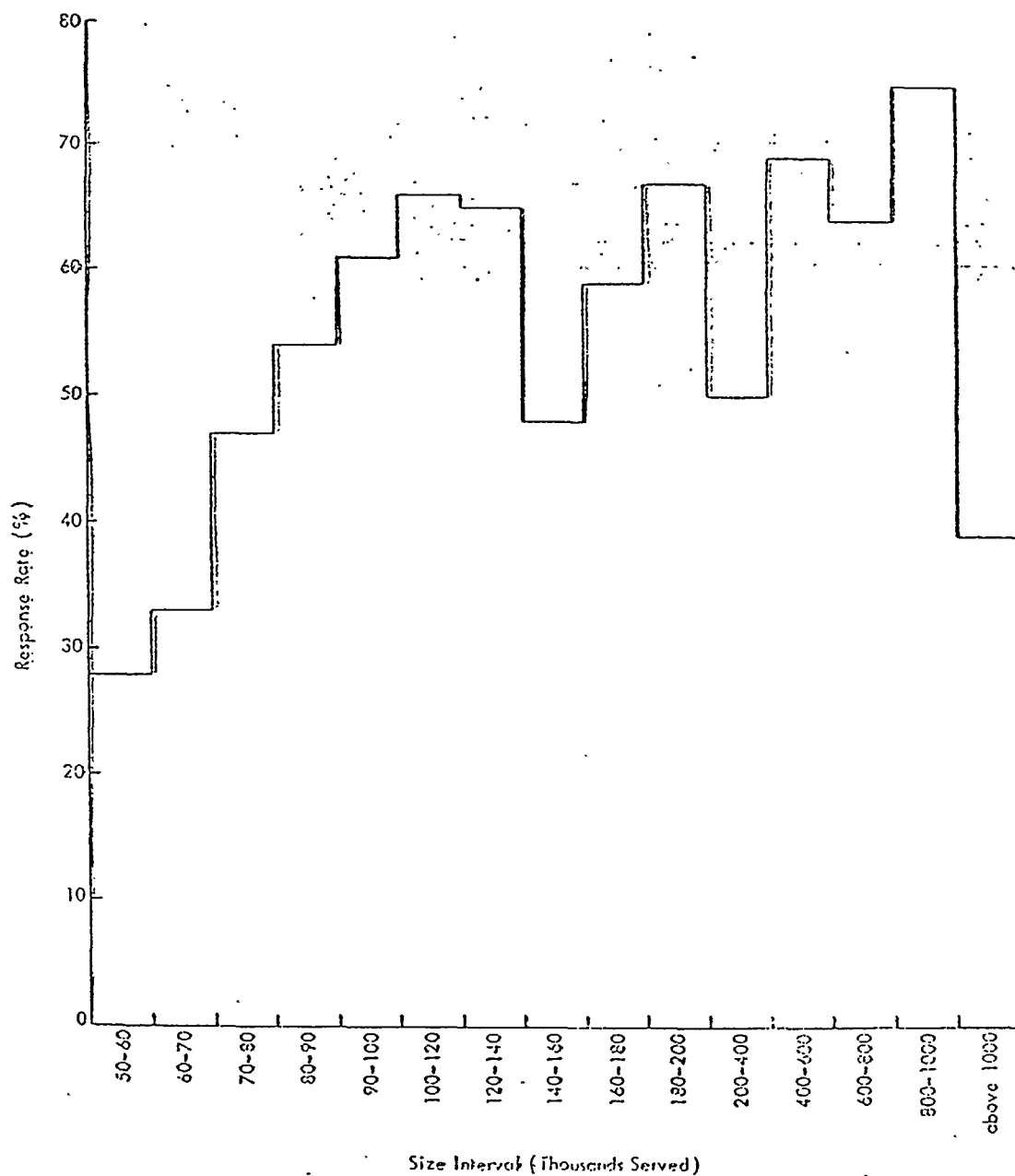


TABLE 4
Response Rate by Size Interval

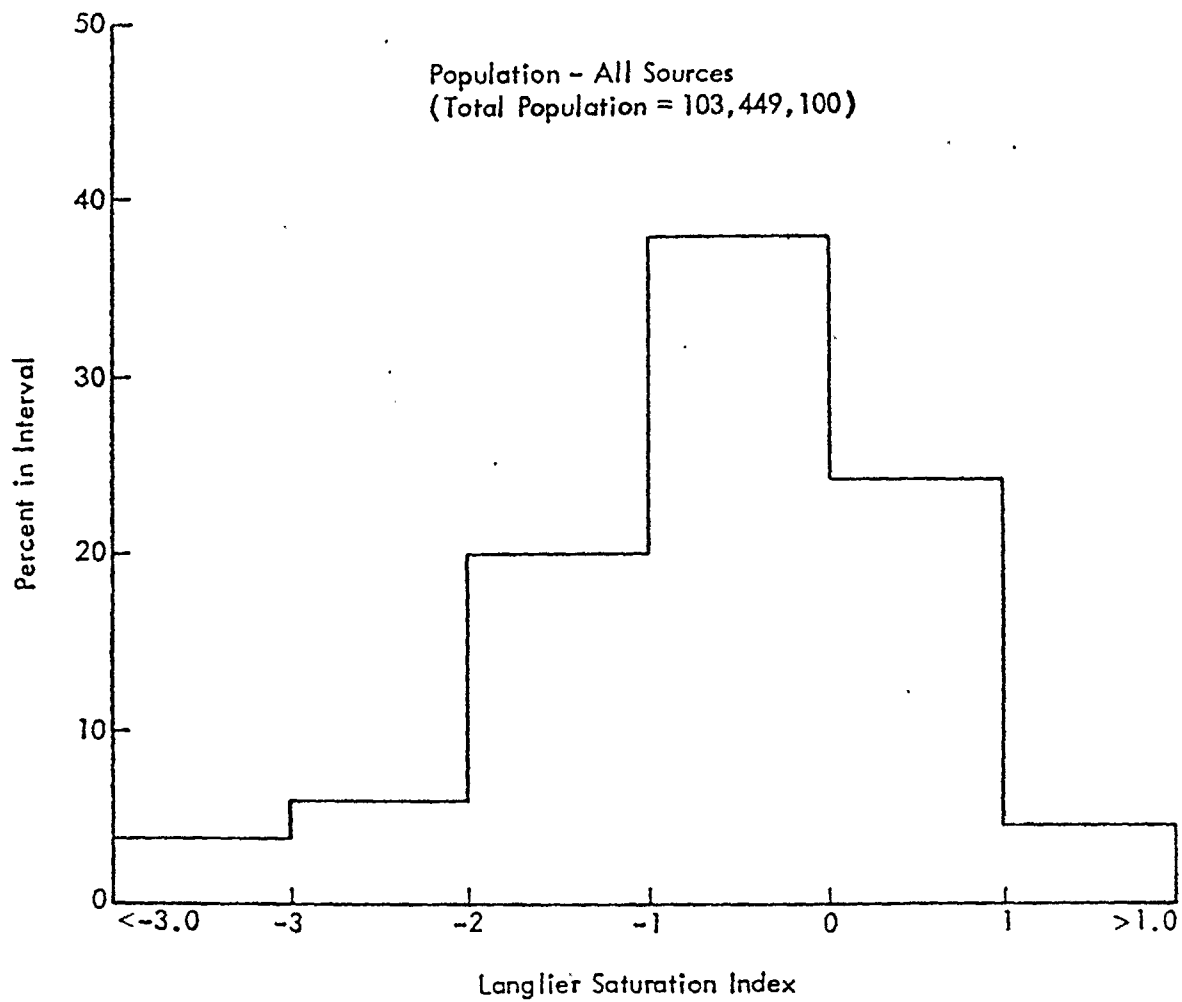


TABLE 5
Population - All Sources

TABLE 6

<u>Character of Water Distributed</u>	<u>Portion of Utilities</u>	
	<u>Millette et al</u> <u>1979</u>	<u>Present Study</u>
Highly aggressive water (AI less than 10.0; LSI less than -2.0)	16.5%	16.0%
Moderately aggressive water (10 AI 12; -2.0 LSI 0.0)	52.0%	51.5%
Nonaggressive water (AI greater than 12.0; LSI greater than 0.0)	31.5%	32.5%

timely recommendation.

Using the information obtained on the quality of water distributed by the utilities, the portion of the population exposed to waters of varying degrees of aggressiveness was determined. Based on the MRI work (Table 7) about 60% of the population studied is exposed to water with a negative Langlier Saturation Index. This indicates that the water is at least mildly aggressive. About 30% of the population is exposed to water with a Langlier Index below minus 1.0 and about 10% of the populace drinks water with an LSI less than minus 2.0. This latter group is exposed to highly aggressive water. In terms of exposures to cardiotoxic metals, or even asbestos, if you wish to look at it as EPA may, this is a rather large population at potential risk.

Among those utilities studied who distribute aggressive water, i.e. a Langlier Index less than minus 0.5, about 26% report losses due to internal corrosion; the average annual per capita costs of such losses is estimated at around \$1.20 (Table 8). For those utilities experiencing losses, but which do not have aggressive water or which have non-aggressive water, the annual per capita cost of the losses is 67¢. That is an interesting figure because it suggests that even the so-called non-aggressive waters also may have some cost impacts. It also may account for the costs of normal obsolescence.

These cost estimates are based only on pipe replacement data. Reported losses due to internal corrosion of meters, valves, storage equipment etc. were beyond the scope of the study and thus, are additive. These costs are very conservative because they do not take into consideration "health costs" which may accrue from potential soft-water induced diseases, that is, the costs caused by hospitalization, out patient service, and lost man hours.

Theoretically, a substantial portion of these losses due to internal

TABLE 7

POPULATION EXPOSED BY DEGREE OF AGGRESSIVENESS
OF WATER ENTERING DISTRIBUTION SYSTEM

		Langlier Saturation Index					
Below		-3.0 -	-2.0 -	-1.0 -	0 -	Above	
-3.0		-2.0	-1.0	0.0	1.0	1.0	Total
<u>Survey Results</u>							
Population in millions	2.743	3.362	6.766	20.715	18.354	4.483	56.423
Percent in Interval	4.86	5.96	11.99	36.71	32.53	7.95	100.0
<u>Supplementary Sources</u>							
Population in millions	1.609	3.466	14.144	20.041	7.252	0.514	47.026
Percent in Interval	3.42	7.37	30.08	42.62	15.42	1.09	100.0
<u>Total-All Sources</u>							
Population in millions	4.352	6.828	20.911	40.756	25.606	4.997	103.46
Percent in Interval	4.20	6.60	20.21	39.40	24.75	4.83	100.0

TABLE 8

COSTS OF INTERNAL CORROSION,
UTILITIES REPORTING LOSSES

<u>Basis for Calculation</u>	<u>Total Annual Costs per Capita</u>	<u>Total Costs Other Than for Steel/Galvanized Pipe Replacements</u>	<u>No. of Utilities</u>	<u>Total Population</u>
Reported costs	\$1.20	Unknown	28	7,244,580
Reported costs without highest cost utility	\$0.48	Unknown	27	7,189,580
Estimated from pipe replacements	\$1.15	\$0.79	35	6,550,450
Estimated from pipe replacements without highest cost utility	\$0.98	\$0.62	34	6,499,450
"Best estimate" (See Table 3-7)	\$0.95	\$0.71	47	10,337,560
"Best estimate" without highest cost utility	\$0.85	\$0.60	46	10,282,560

corrosion should be avoidable if the water is properly stabilized chemically before it enters the distribution system. Therefore, MRI made an estimate of the stabilization costs for each utility determined to be distributing aggressive water. Two methods were proposed: Treatment one was conventional lime treatment, and treatment two was carbon dioxide.

The stabilization costs for the individual utilities were combined to give a national estimate of the cost of stabilization for utilities in the 50,000 and above range (Table 9). For the 177 utilities involved, the annual cost of stabilization was estimated at \$7.5 million, or roughly 14¢ per capita. This estimate assumes a minimum level of stabilization. A very conservative approach to stabilization would triple the costs, giving an annual per capita cost of 42¢. The influence of utilities not accounted for in the analysis would add only another 2¢, and the costs not included for transportation and chemicals would add roughly another 4¢ per capita. Even at the outer bounds, we are talking about costs per capita for stabilizing corrosive waters at 18¢ to 57¢ per person per year. Pretty cheap.

For utilities experiencing corrosion losses and which have aggressive water, the average ratio of the costs which could be avoided by chemically stabilizing the water was estimated. These are average ratios (Table 10) and are important because they are cost-benefit ratios and very favorable ones at that. Next to health effects, a favorable cost-benefit ratio is an excellent selling point for regulation. If we're talking about cost-benefit ratios in the range of 3.8 and 4.8, as shown here, obviously this is a very strong support for stabilization of corrosive waters.

Four utilities experiencing losses due to internal corrosion were considered as case studies (Table 11). These utilities were selected

TABLE 2

SUMMARY OF ESTIMATED TOTAL NATIONAL
COST FOR STABILIZATION^{a/}
(millions of dollars)

	<u>Treatment I</u>	<u>Treatment II</u>
Capital expenditures	31.7	42.4
Annual capital cost	2.76	3.64
Annual O & M Cost	4.77	18.47
Annual revenue requirements	7.53	22.16
Population served by impacted utilities (millions)	52.608	52.608
Average annual per capita costs (dollars)	0.14	0.42
Number of utilities impacted: (population served greater than 50,000; LSI < -0.5)	177	177

^{a/} Calculations neglect 92 utilities (serving 7.6 million people) whose water quality could not be characterized.

TABLE 10

BENEFIT-COST CALCULATIONS FOR CATEGORY 1

1. Benefits = best estimate of losses less losses of steel/galvanized pipe.

Cost = Treatment I cost of stabilization.

$$B/C = \frac{4,307,700}{1,129,200} = 3.8$$

2. Benefits = best estimate of losses less 50% of losses of steel/galvanized pipe

Cost = Treatment I cost of stabilization.

$$B/C = \frac{5,460,750}{1,129,200} = 4.8$$

3. As in (1) with Treatment II for stabilization.

$$B/C = \frac{4,307,700}{3,624,000} = 1.2$$

4. As in (2) with Treatment II for stabilization.

$$B/C = \frac{5,460,750}{3,624,000} = 1.5$$

TABLE 11

CASE STUDIES - FOUR UTILITIES

	<u>UTILITY NO. 1</u>	<u>UTILITY NO. 2</u>	<u>UTILITY NO. 3</u>	<u>UTILITY NO. 4</u>
LOCATION	PACIFIC COAST	PACIFIC COAST	NORTHEAST	SOUTH ATLANTIC
POPULATION SERVED	110,000	1,050,000	35,000	660,000
AVG. VOLUME OF WATER PRODUCED (MGD)	10.9	220.0	6.14	72.0
LENGTH OF DISTRIBUTION SYSTEM (MILES)	275	3,300	115	750
SOURCE OF WATER	RIVER	RIVERS	PURCHASED	RIVERS, LAKES, WELLS
LANGLIER INDEX	-2.9 to 3.0	-0.1 to 0.2	-3.4 to -3.8	-1.1 to -1.7
AGGRESSIVE INDEX	9.1	12.0	8.5	10.7
PIPE - CI/AC	80%/2%	46%/30%	90%/0%	39%/0%

TABLE 12

COSTS OF LOSSES AND ESTIMATED COSTS OF STABILIZATION

	<u>Utility No. 1</u>	<u>Utility No. 2</u>	<u>Utility No. 3</u>	<u>Utility No. 4</u>
Reported annual losses due to internal corrosion	5,200 (meters and storage)	493,000 (includes 45,000 storage losses)	5,280,000 (@ \$100/ft)	?
Estimated annual costs of pipe replacement (@ \$3.50/diam-in.-ft)	184,800 (steel pipe)	342,400 (steel and cast iron pipe)	1,108,800 (cast iron pipe)	887,000 (cast iron pipe)
Best estimate of losses due to internal corrosion	190,000	493,000	1,108,800	887,000
Annual losses per capita (best estimate of losses/population served)	1.73	0.47	20.16	1.34
Estimated annual per capita costs of stabilization of water ^{a/} :				
Treatment I	0.25-0.32	(already	0.41-0.68	0.05-0.07
Treatment II	0.78-0.80	stabilized)	1.02-1.54	0.06-0.21
Benefit-cost ratio ^{b/} :				
Treatment I	27 ^{c/}	-	29.6	19.1
Treatment II	1.1 ^{c/}	-	13.1	6.4

^{a/} Computed for maximum and minimum temperatures, respectively.

^{b/} Computed using more expensive of two treatment costs.

^{c/} Assumes 50% of steel pipe losses can be prevented.

to provide a range of utility sizes, locations, and types of waters distributed. Three of the four utilities would probably benefit from a stabilization program. The fourth already has one. I have also added to the MRI table, the Langlier Index, the Aggressive Index, and a "cast iron" to A/C pipe ratio.

If you look at the reported annual losses due to internal corrosion (Table 12) 3 of the 4 utilities would probably benefit from a stabilization program. It should be obvious, if you recall from the cast iron to A/C pipe ratio on the preceding transparency, that 3 to 4 of these utilities also have a "problem" in the respect that they have metallic materials in their distribution system, notably steel and unlined cast iron pipe.

It is difficult, if not incomprehensible, that something as ordinary and natural as soft water could be potentially dangerous. But in aggregate, the data on the health effects of corrosive waters, their prevalence, and the relatively low cost of stabilizing those waters makes a strong case for cost effective practical regulation.

The Environmental Protection Agency conceptually agrees with this theorem. The soon to be published amendments to the Interim Primary Drinking Water Regulations will propose the establishment of corrosion control programs enforced by the states. Such an informal program is not going to solve the problem, however. EPA probably would mandate tomorrow the control of corrosive waters if the Agency had the scientific data base to support such regulations. The MRI study is the cornerstone of that data base. The bricks and mortar will be added by Energy and Environmental Analysis, Inc. (EEA), who AACPP has retained to prepare a national estimate of the costs (distribution system and health effects) of corrosion in the United States. EEA is a well-known consulting firm in Washington. Its President, Bob Sansom, is former Assistant Administrator, Air and Water Programs, Environmental Protection Agency. EEA and Sansom recently distinguished themselves in spearheading

the National Utility Contractors Association lobbying effort against EPA's proposed policy to withdraw funding of collector systems under the Clean Water Act. We cannot guarantee that EEA is going to perform such wondrous feats for the industry in the name of the corrosive water issue. We can say that the Association has retained a skilled and politically astute consultant as there exists in Washington.

The Aggressive Water Program is on time-schedule and is fast approaching completion. The Association will submit its testimony and studies in late summer. After that, it will be a matter of continually assessing its impact on the regulators and exercising our options accordingly.

In conclusion, the Association's regulatory initiatives can be characterized by the word "momentum." None of them are struggling to overcome the coefficient of static friction ... they are moving, some faster than others, but they are moving towards completion. This time next year, we may be living (for better or for worse) with the fruits of these labors. With that thought in mind, I would like to conclude with two thoughts from an "asbestos industry odd couple" ... Dr. Irving Selikoff and John McKinney (President, Johns-Manville Corporation). In 1977, Dr. Selikoff told this Association; while discussing unnecessary exposures to asbestos: "Do the best that you now can do." As an industry and as an Association, I believe that we have done just that. We have been responsible and we have done our best. Therefore, I submit to you that the A/C pipe industry not only has a right to survive, but in the words of John McKinney: "We will survive."

The A/C Pipe Industry - A View from Canada

by

Michael J. Messel

Michael J. Messel is President of Lac d'Amiante du Quebec, Ltee. (LAQ), Vice-President of the American Smelting and Refining Company (ASARCO), and Chairman of the Board of the Cement Asbestos Products Company (CAPCO).

Mr. Messel is Past President of the Quebec Asbestos Mining Association, a life member of the Canada Institute of Mining and Metallurgy, and has 40 years experience in the asbestos industry.

Mr. Chairman, distinguished guests, ladies and gentlemen, to give a talk on asbestos to such a knowledgeable crowd as is here, is quite a job. It's like the problem of keeping Canada together, and I guess the same applies, trying to keep the asbestos industry together.

I am both honored and privileged to have been offered this opportunity to address this meeting on issues that concern all of us who are involved in the asbestos industry.

I will try to convey to you how things seem today, and how the future appears as viewed by a Canadian asbestos fiber producer. I won't talk too much about asbestos cement pipe, because there are too many experts here!

Canada, as you know, accounts for close to 28% of the world's chrysotile asbestos production. Deposits are mined and the fiber processed in Quebec, British Columbia and New Foundland. In 1978, Canadian asbestos deliveries totaled 1,482,000 tons, for an estimated value of \$509 million.

I might just remark here that I went back over the ten year statistics, and production in Canada has not varied very much; it has stood between a million three and a million four over the past ten years. In 1969, the value was about \$180 million, so you can see what's happened to the price of asbestos since!

World production for 1978 is estimated at 5,352,000 tons, with the U.S.S.R. being, by far, the largest single producer -- 2,350,000 tons, group three to six, and some 600,000 tons of group seven, exporting approximately 800,000 tons per year.

Foremost among the Canadian provinces is obviously Quebec; in fact, more than 87% of Canadian deliveries in 1978 came from mines located in the eastern township. Quebec had asbestos deliveries in 1978 which totaled

1,313,000 tons; a slight increase, compared with 1977. This increase seems to indicate a stabilization of the asbestos market, which had fallen off markedly during the past few years.

The estimated value of the Quebec fiber deliveries can be reckoned around \$460 million. As far as we know, no new major asbestos producing projects are currently in progress, especially in North America. There are deposits available, but they are not being developed. The exception is the Soviet Union, where production capacity is increasing at a tremendous rate, and where it is expected to reach 3 million tons by 1983.

At present, supply and demand seem pretty well in balance, though sporadic shortages may occur in some grades. All in all, given the present economic situation in the countries of the western world, and especially in the United States, it is likely that the demand for fiber will increase at an annual rate of between 1 to 2% over the next few years.

This trend towards stabilization, largely due to the growth of new markets for asbestos cement in the developing countries, offers us encouraging prospects. Nevertheless, these prospects must be weighed, taking into account world economic conditions and particularly, the lower rate of growth expected in the industrialized countries, and the scarcity of hard currency in the less developed countries.

Whatever the growth rate in the demand for fiber may turn out to be in the future, there is no doubt that given the present reserves of Canadian deposits, estimated at over 1 billion tons of ore from which approximately 40 million tons of fiber could be extracted, I am sure that Canada -- and Quebec, in particular -- will be able to supply your market for several decades to come.

Yet, an industry like ours is not solely defined in terms of market prospects and of production and sales figures. It is also defined

in terms of its ability to cope with socio-economic changes, and new power relationships which are bound to arise in a world where all social, political and economic forces are inescapably interdependent.

For instance, the asbestos industry in Quebec has had to cope with the government's new asbestos policy announced in the Fall of 1977, and then outlined in a bill in the National Assembly (referred to as Bill 70) which became law in May of 1978.

The aim of this legislation is to insure the presence of the state on all industrial levels of the asbestos sector. This would first be done by taking control, which they haven't succeeded yet, of a major mining company, Asbestos Corporation, either through mutual agreement or through expropriation and creating a state-owned corporation (the newly formed Societe Nationale De L'Aminate) with an authorized capital of \$250 million.

The new corporation's main responsibility, apart from the acquisition of Asbestos Corporation, will be to invest on its own or jointly with other partners in manufacturing projects and to foster mining ventures.

In addition, the government is set on the establishment, in partnership with the asbestos producers, of a research and development center on asbestos, to promote the development of expertise in this field and the safe use of asbestos products and to develop new products and new applications in order to favor the growth of Quebec's manufacturing industry of asbestos-based products.

Furthermore, the Quebec government has entered into negotiations with each of the mining companies with a view to concluding development agreements spread over the next 10 years or so. Such agreements would deal -- among other things -- with planned investment for converting Quebec fiber in the Province, and with investment programs specific to each company,

according to their peculiarities and degree of specialization, in forecasting their development in Quebec over the next decade.

Obviously, the government's policy has brought about some changes in the rules of the game, and has imposed new challenges on the producers in Quebec. But we are determined to meet these challenges successfully, through constructive collaboration with the state in the pursuit of realistic and financially viable objectives aimed at furthering the socio-economic development of Quebec.

I am therefore, happy to report, really, that we have survived ... that the evolution of the relationship between the asbestos industry and the government of Quebec throughout 1978 marked a new stage in the search for practical and viable means of achieving state-industry cooperation.

This was felt in the areas of research and of occupational health and safety, and it was also noticeable in the fact that both sides, for once, combined their efforts to counter the effects of the anti-asbestos propaganda. Recent meetings in Brussels on matters of asbestos and health, where representatives of the European Commission met the Canadian delegation representing industry and both levels of government, provide a good illustration of the kind of cooperation that we are aiming for.

Of course, the viewpoints of the government and the industry continue to differ on many subjects. As long as the present dialogue continues in mutual respect and trust, and as long as the government does not take undue advantage of the power it holds to further alter the rules of the game, I am confident that a satisfactory modus operandi can be reached.

In the field of research and development, a joint venture is in the making, and in all likelihood, a new center for asbestos research and development, administered and financed jointly by government and members of the Quebec Asbestos Mining Association (QAMA), will see the light of day

in 1979, and to this, the asbestos producers will have to contribute half of 1% of their net sales.

As for the development of asbestos-related manufacturing activities in Quebec, QAMA members - I should really say, AMQ members, since AMAQ is short for "Association Des Mines D'Amiante De Quebec" - have had several projects under consideration but as you are well aware, it is very difficult to take a general approach when discussing the prospects for asbestos manufacturing, just as it is inappropriate to speak of an asbestos finished products industry per se. We're going to transform. Well, what are we going to transform it into? Where are we going to market it? There are a lot of questions.

There is no one specific industrial sector for asbestos finished products. There are industries related to pipe, construction materials, floor coverings, textiles, friction materials and other products, each one governed by its own set of rules, and using asbestos fiber as a raw material in varying degrees.

The Sores - A.D. Little Study, Commissioned by the QAMA two years ago to look into the opportunities of manufacturing more asbestos products in Quebec, has shown the limitations of such opportunities. It indicated some limited possibilities in asbestos paper, brake linings, packings, jointings, and a new more adaptable asbestos sheet, such as Glazol. It also refers to asbestos cement pipes, especially for sewers, as a possibility, but the potential is very limited, especially if governments and municipal authorities don't take the necessary steps to foster the use of asbestos in the various municipalities, towns and cities.

It is they who really hold the key to the short term growth of the domestic market for asbestos, and particularly for A/C pipe in Canada.

Yet, Quebec's policy is geared to producing more A/C pipe, or I should say the Quebec government's policy is geared toward producing more A/C pipe, of which Canadian production is presently valued at about \$38 million, with the idea being to sell it to other markets, principally the northeastern region of the United States.

The synergetic effects of such a policy are difficult to assess, but at any rate, I don't believe it will affect the supply of fiber to the U.S. and to the world's markets, especially as far as A/C pipe fiber is concerned, although there is being forecast a shortage for the mid-80's. However, a lot of this will depend on what happens to blue asbestos in pipes. Should the rules on blue become stringent, and this void would have to be filled by chrysotile, we could have some problems in having sufficient fiber.

As for the prices of fiber, one should expect them to increase (as will no doubt, all other commodities) but probably at a slower rate than they have during the past five years.

The asbestos producers are very conscious of the need for asbestos cement products to remain competitive. Yet, they have to contend with inflation and wage settlements beyond productivity returns and of course, the consumers in the last year or so had the advantage of the Canadian dollar.

As suppliers, we are particularly concerned about the proposed regulations that might come into force in the United States and in western Europe, and the negative impact it would have on the sales of A/C pipe in those markets. Asbestos cement pipes constitute an extremely valuable market for Canadian asbestos producers. After all, 70% of our production is used in the manufacture of asbestos cement products around the world, and I would estimate that of this 70%, about 40% goes into A/C pipe. That makes about 28% of the total production, so you can see it's a very important market.

Needless to say, we hope to maintain our present share of the fiber supply to the A/C pipe markets, but we also expect some growth in the new asbestos cement markets in the developing countries, where a number of new plants are now being built.

Now, of course, there is also the possibility that PVC may increase in price to a prohibitive level, and ductile iron could go up in price, as the scrap has increased by approximately 40%, and for a while, at least, this would give the A/C pipe producers a very useful advantage, and I hope they're ready to make use of this advantage.

We, as producers, are making a serious effort to develop fiber grades more suitable for A/C pipe and for other asbestos products. The manufacturers must, and are making technological and research progress in search of improving the existing asbestos products and developing new ones. This effort must go on vigorously if we are to prevent any decline in the use of asbestos products, and to attract new investment capital.

This being said, I am fully aware of the challenges that the asbestos cement pipe producers are confronted with, and of the impact that governments, consumers, and competitive pressures may have on the future growth of the A/C pipe industry, thereby affecting the development of the asbestos industry as a whole.

I would like to take this opportunity to pay tribute to your Association for the dynamic and imaginative initiatives it has taken in dealing with the issues and problems facing it. You have been very positive, and I certainly want to congratulate the outstanding work that has been done by this Association.

But the problems you face today, you face in common with the entire asbestos industry. The challenges you must meet are those that all asbestos producers and manufacturers are also confronted with, whether it be to defeat

the hostile propaganda which is spreading misleading information about the alleged dangers of asbestos and giving rise to the adoption of increasingly rigid laws and regulations concerning the use of asbestos-based products, or to step up the penetration of new markets; whether it be to increase our productivity and perfecting our technology, whether it be to improve the health and safety conditions in our plants and the quality of the environment; or to promote the safe use and application of asbestos in all these cases, the task to be accomplished calls for a concerted effort, both at the national and international levels.

A joint effort of all those concerned with the future of the asbestos industry, and more specifically, of all the asbestos organizations such as yours, the Asbestos Information Association, the Asbestos International Association, the Asbestos Producers Association, and all others.

The asbestos industry must take a stand and make its voice heard. It must communicate with the consumers, the environmentalists, as well as with the governments, politicians, labor, and with the general public. I think the day is gone when we can hide away from any dialogue. We must face the general public with the facts. And let's hope that the press gives us a hand in getting the proper facts across.

These propaganda and anti-propaganda situations -- a lot of them belong in and are talking about the past -- conditions that no longer exist today in any shape or form. It is as they have called it, "industrial archeology", and they are forecasting this forward on the future, unjustly and unfairly.

I don't think that we are getting the proper credit for the remarkable achievements of an industry with the progress that it has made in technology and in environmental affairs. The fact is that the new asbestos products currently on the market are safe since they are manufactured in such

a way as to insure that dust-spreading is practically non-existent.

The fact is that asbestos is a unique product, a natural material of great value, providing characteristics which are found in no other product and which are of inestimable benefit. The fact is that the biological effects of the products which some people would like to use as substitutes are completely unknown, whereas asbestos, after over a half century of scientific and medical research, is today, we believe, one of the safest products on the market because it can be perfectly controlled. The fact is that asbestos still has an immense contribution to make to the welfare, the security and the protection of mankind.

No one will deny that the asbestos industry, like so many other industrial sectors, has had to face health problems arising from its activities. But most of these problems have been eliminated, or a lot of progress made on them, and the remainder, I think, are in the process of being solved.

We now know, for instance, that the level of asbestos dust to which the general public is exposed does not really present a danger to health. It's been that way a long time. In the case of A/C pipe, results of a study commissioned by your Association show that the methods used for cutting and sawing asbestos cement pipe today are reasonable safe, except for one method which had been rejected by your Association several years ago.

It is a fact that our Quebec mines and mills, a survey of 6,800 workers by Special Committee of the Quebec Workmen's Compensation Board, shows that the enormous effort and energy devoted to eliminating the causes of asbestosis are proving effective, and that asbestosis-related anomalies have not only considerably decreased in number but are well on the way to being eliminated.

Let it not be said that we of the asbestos industry are not prepared to face up to our social and ecological responsibilities. As an example, in

the present decade, the Quebec asbestos producers alone will have devoted some \$80 million to works designed to achieve optimum dust elimination, and to improve the hygiene conditions of their mills and other installations.

The QAMA members through the Institute of Occupational and Environmental Health in Montreal, which was established in 1966 and is completely funded by the industry, have allotted to date close to \$6 million for independent scientific research projects. It has thus made the most important contribution world-wide, to the advancement of science in the area of biological effects concerning asbestos.

But, we have other responsibilities too and let us be quite clear about these. The economic well-being of tens of thousands of workers and their families and of hundreds of communities on this continent, in Europe and other parts of the world, depends directly on the asbestos industry and its future vitality.

If, as has been said, the essence of man's relationship to his environment is the ratio of benefit to risk, and considering that every scientific, technical, economic and even cultural advance, involves some degree of inconvenience, then society must be made fully aware that, as regards human safety, industrial progress and economic growth, asbestos is decidedly a major asset. It is up to us to drive this message home by every means at our disposal. In closing, I would like to quote from James Joyce. "The past is consumed in the present, and the present is alive only because it gives birth to the future."

Thank you.

ISSUE: 1980 - 1985 Economic Outlook for the

U. S. Construction Industry

by

Thomas R. O'Connor

Tom O'Connor is Director, Economic Research for the Portland Cement Association, Skokie, Illinois. In this position, he is responsible for forecasting cement consumption, analyzing the cement industry's energy and labor usage, and publishing capacity information.

Prior to joining PCA, Mr. O'Connor was Corporate Economist for the Magnavox Company, Associate Professor of economics at Wabash College, and Senior Financial Analyst for National Gypsum Company.

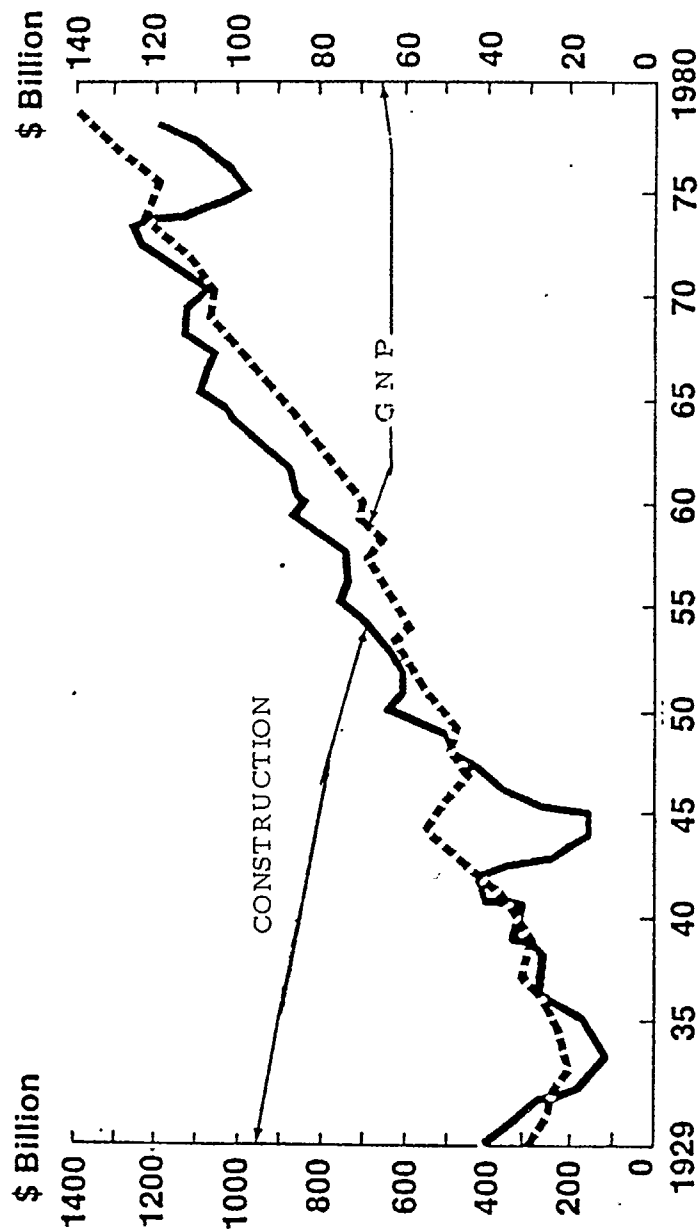
This afternoon's session is devoted to analyzing the long run outlook for the U.S. construction industry through 1985. The timing of this session could not be more appropriate. In 1978 the construction industry expanded at an excessively rapid rate to cause shortages of building materials. While the events of 1978 were critical for the construction industry and had a direct effect on many companies' profit and loss statements, the real issue of the building material shortages is really a longer term problem. For capital intensive industries like cement, plans have to be made not to modernize, expand and revamp plants if future shortages are to be avoided.

While today's topic is the long term outlook, I have brought along copies of my 1979 cement consumption forecast which gives an overview of the 1979 construction scenario that we have been using. The longer term analysis that I will be reviewing with you is consistent with the short run forecast that we have published in February.

The approach I will take is rather straightforward and hopefully cogent. I will try to put the construction and cement industries into their historic perspective in the U.S. economy and then offer my opinions about the long run outlook for various markets. Throughout the presentation I will be using the 1972 constant dollar series for GNP and construction put in place as published by the Department of Commerce. The cement data are in 2,000 lb. tons and are published by the U.S. Bureau of Mines.

Chart 1 - The pattern of construction growth is highly correlated with the development of any economy. The construction industry, however, is more susceptible to business cycle deviations. This can be clearly seen throughout the history of the U.S. economy and the construction industry. In 1930 to 1933, the great depression, the construction industry fell

Gross National Product (GNP) and Construction 1972 Constant Dollars



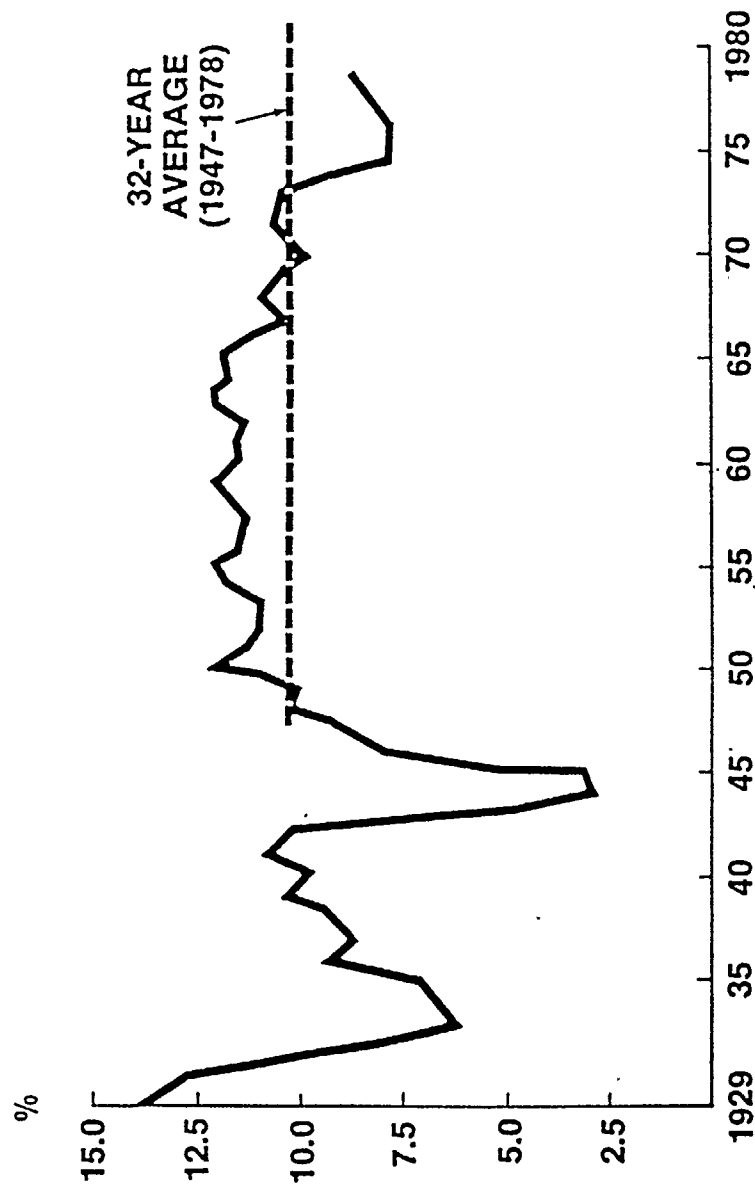
dramatically. The second major disturbance occurred during the war years, 1942-1946. In the post-World War II period the economy suffered recessions in 1953, 1957, 1961, 1970, 1974, and 1975. The construction industry had one additional slowdown which was in 1966 when the economy avoided a recession but the construction industry suffered from the first post-war money crunch imposed by the Federal Reserve.

The relationship between construction and GNP growth can be viewed in a slightly different fashion by looking at the ratio of construction spending to the Gross National Product.

Chart 2 - The impact of the depression and World War II are even more dramatic in terms of the fluctuations in the ratio. The chart also shows the recessions and the severity of the 1974 and 1975 decline. Through the post-war period, construction on average accounted for 10.2% of the U.S. Gross National Product. However, with the onslaught of inflation, the construction industry has been losing share of the GNP pie consistently since the mid-to late 1960s. This chart raises the first issue for the construction industry. Will construction ever regain its traditional role in the economy? Unfortunately, the answer is probably "no". As I have mentioned, inflation hits the construction industry probably harder than any other sector in the economy. This is due, of course, to the intrinsic need of construction to finance projects. The construction industry therefore has traditionally been susceptible to changing conditions in the financial markets. Secondly, the construction industry is heavily dependent on government funding and in a time of inflation and taxpayer discontent with rapidly growing government deficit, the ability of the government to finance additional construction projects will become more and more difficult.

We also have the fact that the economy has become and will continue to become increasingly dependent on the service sector for jobs. This means

Ratio of Construction to GNP 1929 - 1978



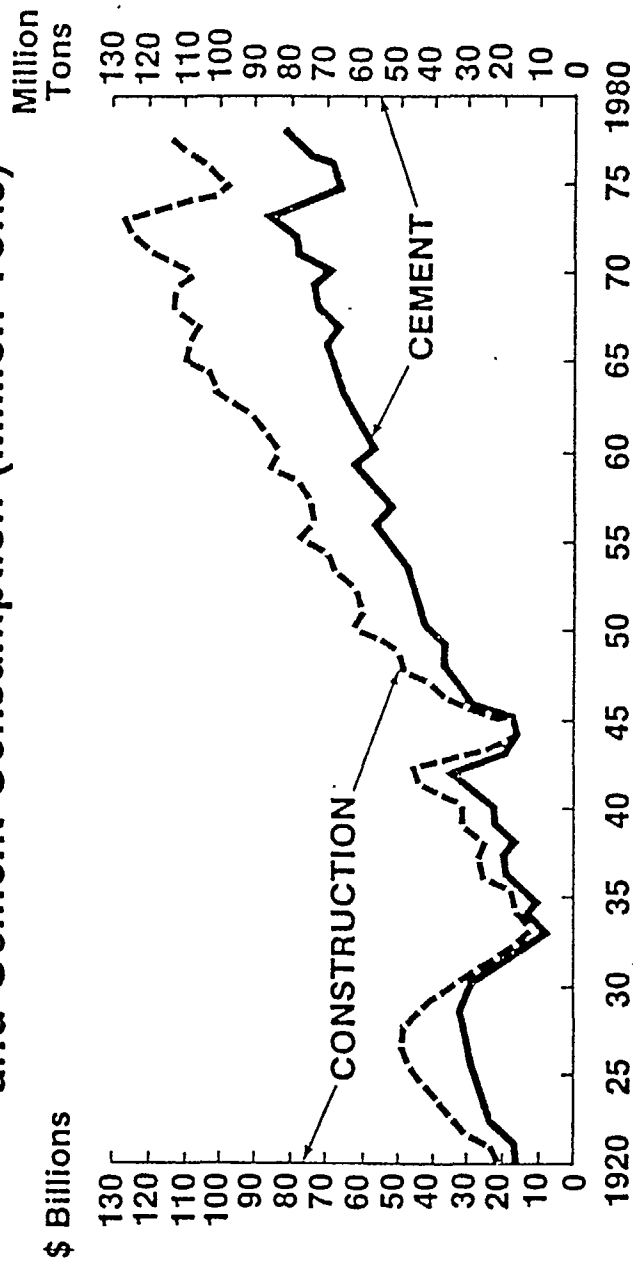
that a larger and larger portion of the work force will not be employed directly in producing goods. As a result, the construction industry will continue to get a smaller and smaller share of the GNP dollar. While the ratio did recover in 1978 we don't see that it will get above 9% throughout the 1985 period. This, of course, is a full one percentage point below the post-war period average.

Chart 3 - It would be incomplete for me to stop with the construction industry without going directly to the industry I represent, namely the portland cement industry. Similar to the relationship seen between construction and the economy, there is a high correlation between the growth of construction and the growth of cement. The impact of market disturbances can be seen in both series. The impact of the depression, the war, and recessions, are clearly evident in both series. Similar to the construction/GNP relationship, we like to analyze the ratio of tons per \$1,000 of construction.

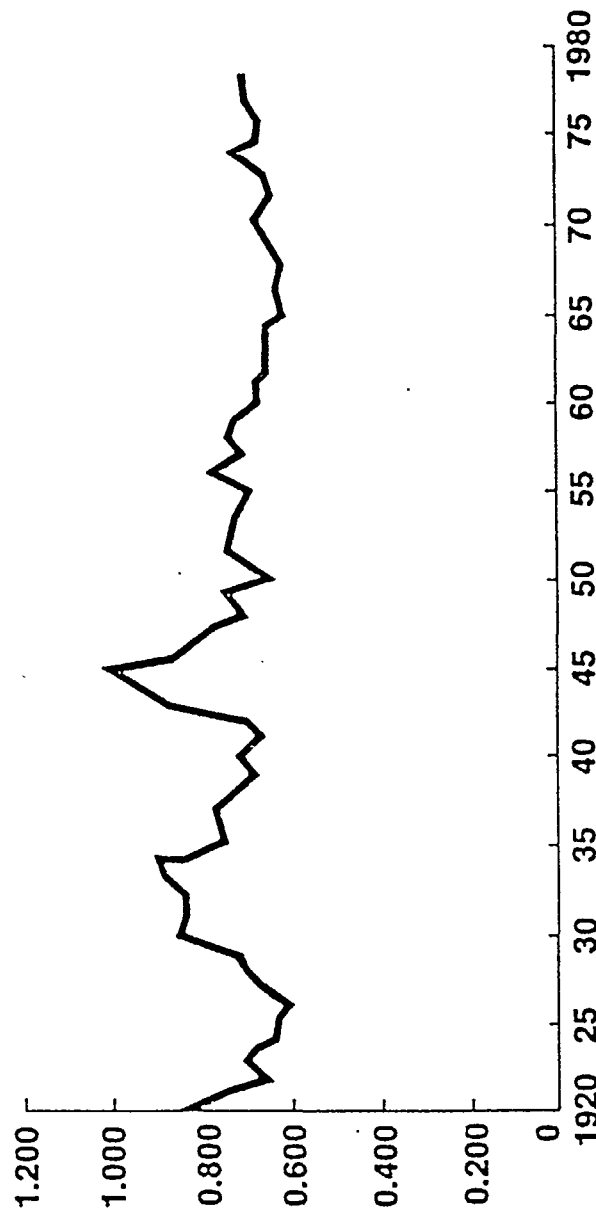
Chart 4 - Unlike the construction industry, we did relatively well during World War II. This of course is due to the building of airstrips, ammunition facilities, and public works projects that were cement intensive while the discretionary construction projects were essentially abandoned. So the cement industry enjoyed their greatest penetration during the World War II period primarily due to the abnormal construction mix. You will also note that the ratio has started to slide in about 1956 and slid slowly but continuously through 1969. Since that period, it has essentially stabilized at about seven tenths of a ton per \$1,000 of construction.

To get some insight into the movement of this series and also a better handle on the outlook for construction, it is necessary to look at some individual construction markets. In all of the following graphs I have indicated my projections through 1985. As I already mentioned, the 1979-1980 projections are consistent with our published short run forecast.

Construction, 1972 Constant Dollars (\$ Billions),
and Cement Consumption (Million Tons)



Ratio of Cement to Construction
Tons per \$1000 Construction



The 1981 through 1985 projections represent an analysis of growth patterns rather than a business cycle analysis. It is our preference at PCA to keep the business cycle analysis to the forecast period of less than two years and concentrate on analyzing secular growth trends for forecast periods beyond two years in length.

Chart 5 - The residential market has a couple of interesting elements. In the post-war period 1947 through 1970, the pattern of the residential market was best characterized by stability. The market grew and did show the traditional vulnerability to business cycles but the peak/trough deviations were relatively narrow. However, as we started into the 70s, the magnitude of the business cycle expanded. The bubble in 1972 and 1973 far exceeded any previous housing expansion. The current recovery must also be classified as a surprise. A year ago there were few economists who believed that the housing market would remain at the two million unit level in 1978.

As indicated by the dotted line, we are forecasting the 1979 housing construction will decline rather significantly. However, in terms of its historic perspective, 1979 will still be a very good year in housing. If we follow a scenario that interest rates peaked in the third quarter and that the expected recession is mild, we expect that housing will recover modestly in 1980. Beyond that point we believe that the demographic factors, explicitly the relatively rapid growth in household formations that are predicted through the 1985 period, should support an expanding and healthy residential market.

From a demand standpoint, housing should be an excellent construction market through 1985. The only real issue is, can the construction industry meet the demand at a reasonable cost and without severe building material shortages. If the housing market stays within a narrow band, I

Residential Construction,
1972 Constant Dollars



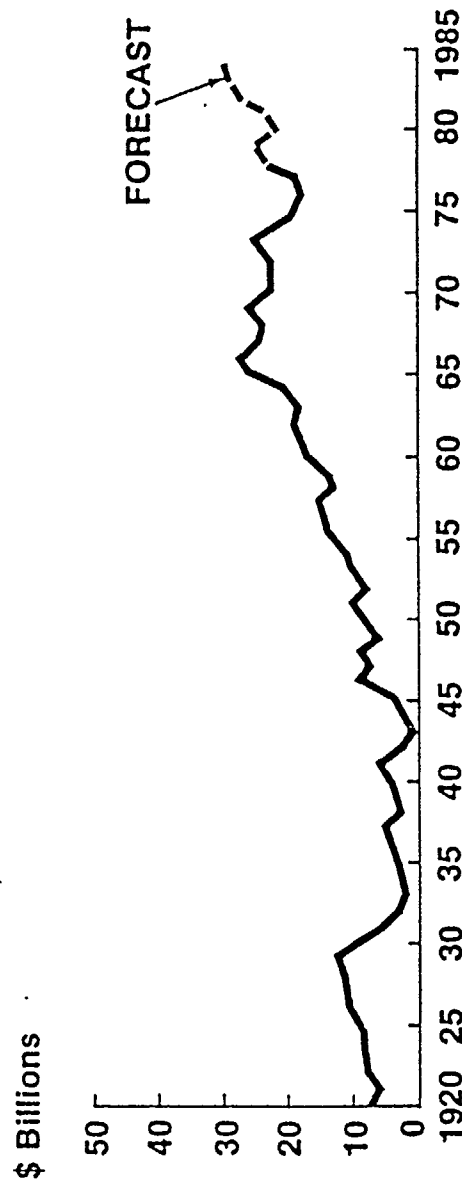
think the problems could be minimized. However, if the cycle continues an explosive pattern as it did in the 70s, then I would expect this market to be a major problem market in the 1980s.

Chart 6 - In terms of the construction outlook, this is the key market and by far the most controversial. In the 1950s and through the early 60s, the U.S. business community made investments at a relatively rapid rate, expanding the productive base that permitted the economy to grow. With the onslaught of inflation in 1968, EPA's regulations in the 70s, the re-evaluation of energy costs in the 70s, and the general increase in government interference in markets through regulations, it is clear that investment by the business community has not grown in the past decade. The result of course has been publicized in the recent years that the U.S. economy is suffering dramatically from declining productivity. This cannot come as a surprise when investments are simply replacing antiquated facilities and new capital is not being pumped into productive plant equipment at a sufficiently rapid rate.

Two extreme scenarios can be considered. The first is that in the longer term investments will be made at a more rapid rate and that the pent up need for new capital will explode in the 1980s. These new investments will provide an increased productive base for the economy to continue to grow at its historic rate. Consistent with this scenario, of course, would be the expectation that inflation would subside from its current high levels.

The second scenario involves one in which government regulations kill the goose that lays the golden eggs. The business community essentially gives up and we look to the government to solve our problems. We end up with nationalized industries, increased government regulations, and probably the same sorry mess as the United Kingdom.

Non Residential Building Construction, 1972 Constant Dollars



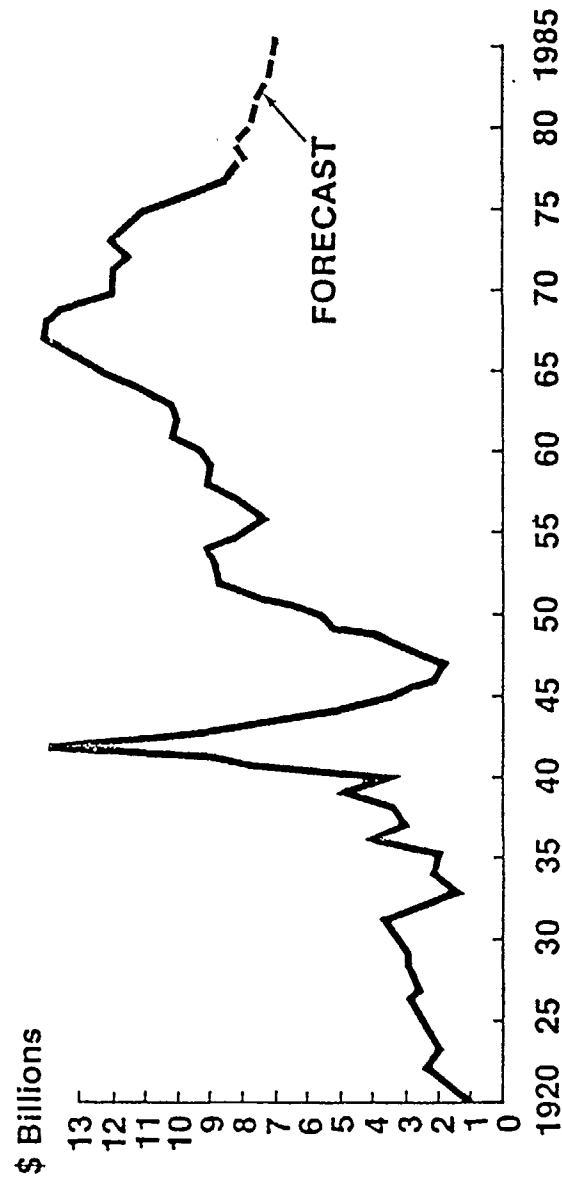
While neither of these extreme views will probably take place, I would tend to be more optimistic and I have pictured a more favorable spending pattern than many doom and gloom economists would foresee. We believe that the nonresidential market will expand in 1979 but decline in 1980. We believe it is possible for the market to follow a relatively fast growth path between 1980 and 1985. The real issue is, will the government allow the business community to do business and thereby encourage a resurgence in investment in capital goods.

The three remaining markets include some rather dramatic differences and, of course, one of the markets should be of real interest to you. The three markets that I want to highlight are the public building, highway construction, and the sewer and water markets.

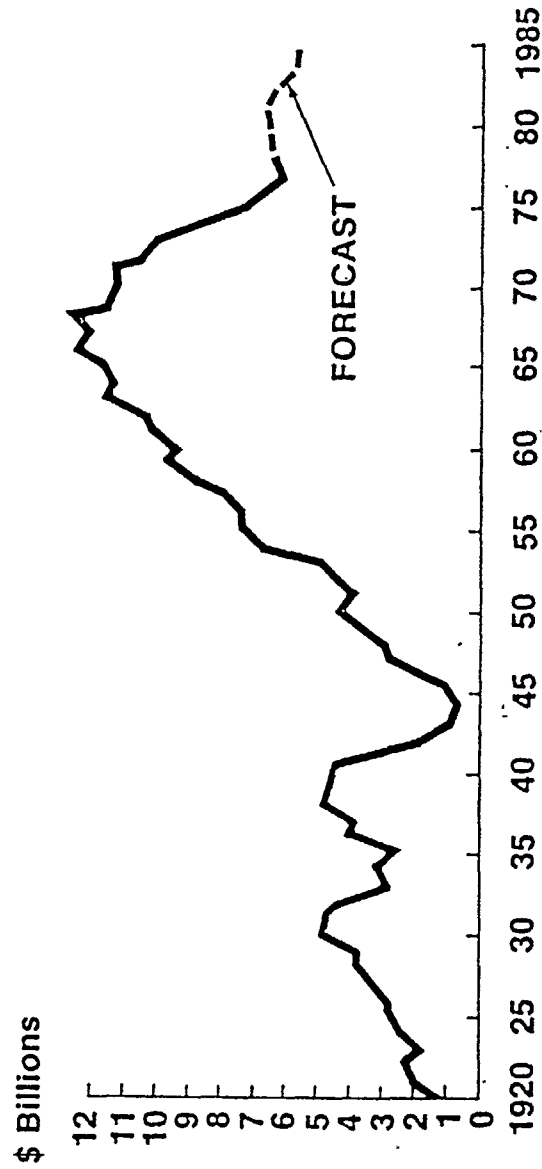
Chart 7 - The public building follows closely the demographic development of the country, ignoring the rather sharp fluctuation in the second World War. The public building market had a tremendous expansion with the maturing of the World War II baby boom. From 1947 through 1968, the market experienced rapid growth as schools were built. However, the market peaked and has been declining since the 1969 period. With the demographic pattern indicating that the age group 16 years or younger will continue to decline dramatically throughout 1985, we do not foresee that the public building market will recover and in fact we expect it to decline throughout the forecast period.

Chart 8 - The highway market again represents a very clear pattern that parallels the funding and development of the interstate system. The U.S. government embarked on an aggressive highway program immediately after the war that was to develop a network of highways that would become an integral part of the nation's transportation system. It is clear that the highway market also peaked in the late 60s and has been declining.

Public Building Construction, 1972 Constant Dollars



Highway Construction, 1972 Constant Dollars



While the interstate program is generally well funded, this market indicates both the completion of the interstate system and the sinister impact of inflation. We have projected that the market will improve slightly through 1980 but then continue on a moderate decline through 1985. I am sure you are all aware that the current highway and mass transit bill is funded through 1981 and the biggest problem of course is the issue of the purchasing power of the committed dollars in terms of construction materials. If there is an issue in the highway market it is the one of funding the massive repairs that are now needed to revamp roads built more than 20 years ago. The second major issue of course will be the issue of energy and whether the country will fund different types of transportation systems as the cost of energy increases. However, I don't think we have sufficient time to pursue all the various aspects of the highway market.

Chart 9 - Finally, I come to a market that of course is the market that you are most interested in. The sewer and water funding show a very steady and rapid growth through 1968. The construction spending declined significantly from 1968 to 1972 but then started on a relatively rapid growth expansion. The industry also had a major setback in 1975 and 1976. Spending again jumped up aided significantly by President Ford's injection of \$4 billion at the end of 1976 under the Public Works Full Employment Act. We feel that this market will continue to expand. The EPA has addressed the issues of clean air and will continue to work at the problems of water run-off and clean water. Given that we expect a relatively strong residential market, and that EPA will be heavily funded in waste water treatment projects, we expect this market to grow throughout the 1985 period.

Before aggregating into a construction market, I thought it might be helpful to simply look at a profile of the growth patterns in the various markets.

Sewer and Water Construction, 1972 Constant Dollars

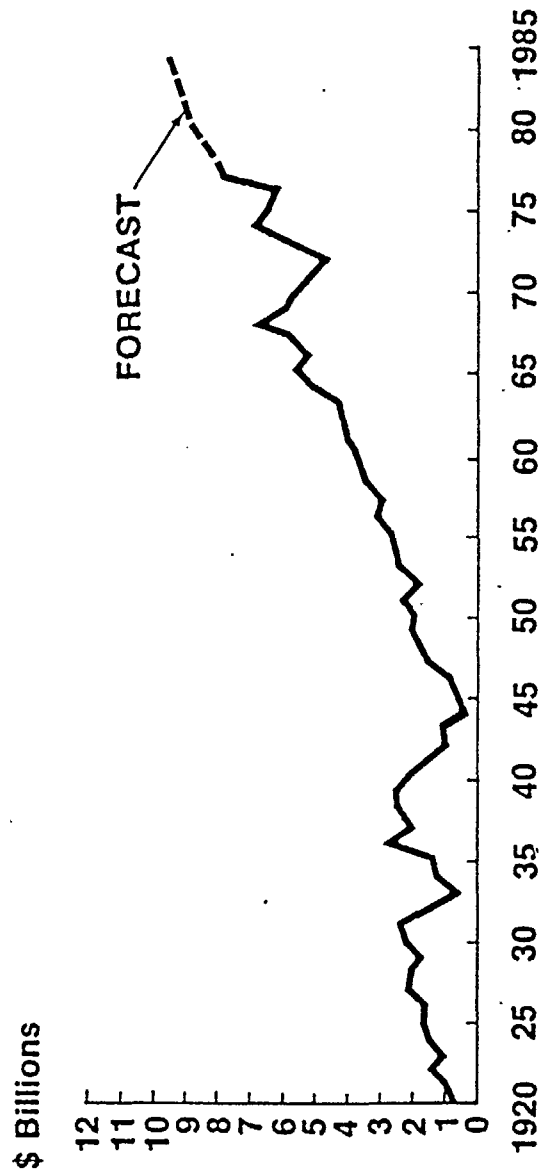
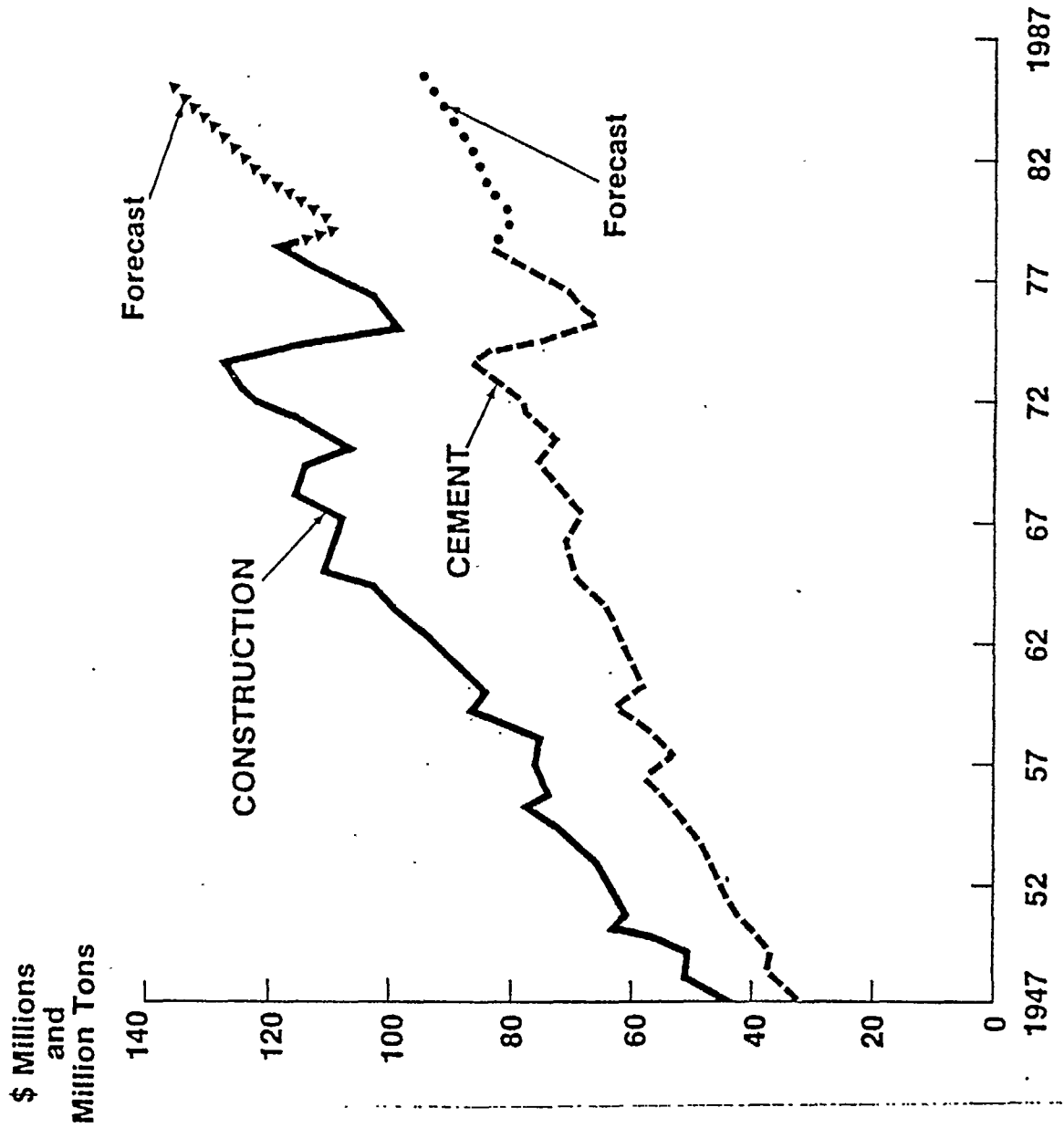


Chart 10 - The economy has consistently grown regardless of the period chosen at a rate between 3 and 3.5%. The construction industry fared better during the entire post-war period than it has in the past 18 years. One of the major factors contributing to the slower growth is the decline you have already seen in public buildings and highways. Relatively healthy and robust growth rates can be found for the sewer and water market and for residential construction. The nonresidential market of course shows the impact of the investment slowdown in the past 10 years. The cement industry has had relatively stable growth between 2% and 2.8%. It is our expectation that GNP will continue to grow at a rate closer to the post-war average. This of course is consistent with the expectation that greater business investment will be made and productivity will improve.

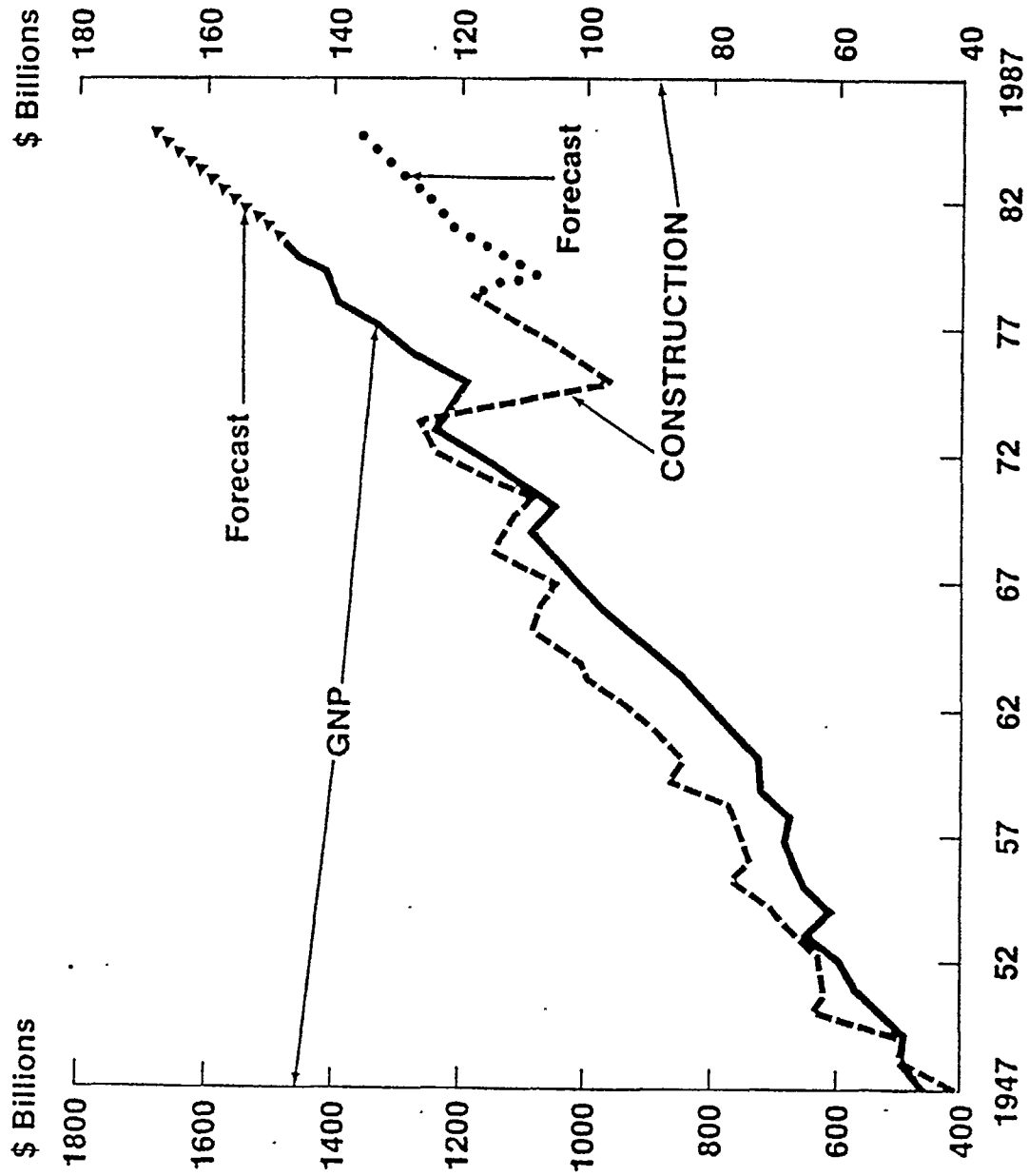
Chart 11 - While the scale would indicate a relatively rapid expansion, the growth pattern is consistent with the post-war period historic trend. For the construction industry we expect that growth will resume but that the gap between GNP and construction will not be closed. As indicated in the individual markets, we expect that construction did peak in 1978. A decline of approximately 10% is expected for 1979. The recovery should begin in 1980 with a modest increase and then a larger increase in 1981. From 1981 through 1985 we expect that the industry could sustain stable growth.

Chart 12 - For the cement industry the pattern will be very similar to that of the construction industry. However, as you will note, the gap between cement and construction continues to widen. This is primarily due to the changes in construction mix. The cement industry's penetration in highways and public buildings is far greater than its penetration in residential construction. With residential construction continuing to dominate the construction industry we expect that the growth

Construction (1972 Dollars) and Cement (Tons)



GNP and Construction 1972 Constant Dollars



Average Annual Growth

	1929-1978	1947-1978	1960-1978
GNP	3.0%	3.3%	3.5%
Construction	2.1%	3.2%	1.8%
Residential	2.7%	3.1%	2.4%
Nonresidential	1.2%	3.6%	1.6%
Public Buildings	2.0%	4.8%	-0.7%
Highways	1.0%	2.6%	-2.1%
Sewer/Water	2.8%	5.3%	4.0%
Cement	2.0%	2.8%	2.0%

in cement consumption will be slightly less than the growth rate experienced in construction.

The purpose of today's talk was to summarize the issues and I think the issues are rather clear. The U.S. economy must nourish and support a healthy construction industry if the economy and U.S. standard of living is to even approximate its historic performance. The key market will be the development of nonresidential investments. Unless there is an improved investment climate and the investment comes forth during the outlook period, the U.S. economy will continue to be plagued by inflation and deteriorating growth.

For the cement industry, the challenge is also quite clear. There is a need to replace and modernize many facilities. Currently, more than 20 million tons of capacity is scheduled to be modernized or expanded, but inflation and government regulation continues to hamper the flow of capital necessary to guarantee adequate supplies.

We believe that the outlook for the construction industry and cement is good and we are optimistic that the economy, construction, and cement, will meet the challenges of the 1985 period.

ISSUE: 1980 - 1985 Economic Outlook for
the Canadian Construction Industry
by
William Nevins

William Nevins is Chief Economist for the Canadian Construction Association. In this position he is responsible for providing the industry with timely advice on such subjects as materials supply, manpower needs, construction forecasts, and the implications of government economic policy.

Prior to joining CCA in 1973, he established a short and long range market and economic research function for the Dominion Bridge Company. He started his career following graduation from McMaster University, in the Market Research Department of Canadian Industries, Ltd., in Montreal.

Thank you very much for your kind introduction. I'm delighted to be with you today. My thanks are twofold, first, to be part of such a distinguished panel before such a distinguished audience is something that I appreciate. The other factor, of course, is what we can't see in the room here, the location of the meeting.

Many of you in the audience are not from Canada, and for that reason, you might not have heard of or know very much about the Canadian Construction Association. So I would just like to say a few things. Basically, CCA is a voluntary association of companies whose affairs are closely allied to what is happening in the construction business. Our membership includes general contractors, trade contractors, manufacturers, distributors, service type industries, such as commercial insurance companies, chartered banks, and cost consultants in the construction field. It's quite a diverse constituency.

The policy direction of the Association comes from its Board of Directors and is carried out by a permanent staff, located in Canada's capital of Ottawa. We tend to divide our affairs between outward and inward-looking things, outward in this day and age being towards government and inward with respect to being a resource center for our members in areas such as economics, labor relations, legal, and technical services.

With that little introduction, I want to spend the balance of my time in three ways. One, to sketch out for you the current construction situation in Canada. Secondly, to put before you what seems to me some reasonable expectations up to the year 1985, and also to plant a couple of thoughts in your minds as to what this might mean to your own business.

Before focusing on the specific details of the construction situation, I would like to take a bit of time to sketch in some background information.

In real terms, construction activity in Canada reached peak levels in 1975. The peak that we had in 1975 was in response to a measurable slowing in the rate of growth in the general economy in Canada after 1973. The result of this pattern is that by 1987, total real volume in Canadian construction was about two and a half percent below the level that was recorded in 1975. Now, obviously, there were many variations, and very significant variations, around this average. Construction spending by utilities and mining continued to be very strong, being induced by large-scale energy projects in Canada.

However, the sustained growth that we saw in the utilities and mining area was offset by a significant decline in commercial building work, which in 1978 was only two-thirds of the volume that was reported in 1975. The pattern basically seems to be deteriorating because we find that even in the strong areas related to energy investment, the contract award volume appears to be softening.

With regard to construction costs and prices, construction cost inflation was running at over ten percent a year rates in '75-'76, largely reflecting wage gains in excess of 14 percent per annum. By 1978, our wage inflation had come down to about six and a half percent a year, more due to wage controls in Canada which were effective up until April of last year than due to any hard bargaining position on the part of management or any realistic assessment of construction prospects by union business agents.

On the material side of construction costs, price inflation on materials was less than annual rate of six percent in 1978. The net overall result has been that cost inflation in the Canadian construction industry has declined at a seven percent annual rate in 1978, as compared to the ten percent that prevailed in '75-'76.

We do not have exact data, but we suspect that reduced contract offerings probably has generated a situation where bid prices have not been able to match the cost increase which have been recorded. What is the situation in

1979? On the basis of what information is available, total real growth in construction in Canada is expected to be little changed in 1979 from what it was in 1978, with the best guess at this time being an increase in real terms of only about one percent. Regardless of what is the precise and exact rate, the significant point is that real growth in construction in Canada during 1979 will continue to be less than the growth of the Canadian economy. Within this average, there are the inevitable variations. Construction contract work originating with the mining industry appears to be a source of increased contract offerings during 1979. But within that category, there is a dramatic shift that seems to be happening with the activity shifting towards metal and nonmetal mining, and away from energy-related mining.

Commercial building construction, and when I speak of this, I am referring to privately-initiated work as distinct from government buildings, this appears to be recording some substantial strength in 1979, although it is not evenly disbursed throughout the regions of Canada. It's a spotty thing, a few big projects in a couple of areas, and that's boosting the total numbers.

The utilities market for construction, which is largely dominated by electric power construction programs, appears to be headed for some weakness during 1979. One area where there appears to be a boom happening in '79 is in the area of what we call institutional building, which is largely educational facilities. We have a hard time understanding this, given the empty classroom space that prevails in almost every school in Canada. So at this point time, exactly why we are having a boom in school building is a puzzle. I am not looking upon what is happening in 1979 as being any indication of what the prospects are beyond. In Canada, as is the case in the United States, there has been a strong public sentiment towards restraint in public spending.

In this environment, it is not surprising to find the construction work originating from government departments is expected to be less in 1979 than was the case in 1978.

Finally, with respect to the residential market, the plans of builders and those knowledgeable about the details of this market suggest that housing starts during 1979 will not be very much different than the 220,000 unit level that was realized in 1978.

Looking to the cost and price performance during 1979, the disturbing pattern is that construction costs may inflate at a slightly higher rate in 1979 than was the case in 1978. The wage side is pretty good, it is really performing better than at any time during the last 15 years, with the 1978 bargains yielding something on the order of a six-and-a-half percent increase over two years. That is a full package rate. But partly in response to the decline in the Canadian dollar relative to other world currencies, the price inflation factor of construction materials has been rising. This has been the main factor in reversing the trend towards an easing down in the rate of construction cost inflation in Canada.

We still do not find too much evidence that bid prices can fully reflect the kind of cost increases that are happening. Turning from the certain "here and now" to the much less certain "longer run future", the underlying assumption of our construction outlook is the Canadian economy will have a struggle to get its real growth anywhere close to what is judged as our potential growth, until such time as that potential growth rate starts to decline. Eventually we're going to catch up again, but not for very positive reasons.

Now, even within this less-than-optimistic general economic framework, it has to be stated first off that the construction situation in 1979 in Canada has to be viewed as disappointing. In a global way, about the only positive thing that can be said about 1979 is that it appears that construction

contract aware volume appears to have stopped declining. Over the next few years, to 1982, the forecast for construction calls for average real growth of about four percent per annum. There is a prospect for sustained strength in construction originating from the mining and manufacturing industries, but very irregular and offsetting patterns in most other construction markets. By irregular and offsetting patterns, I mean that expectations for weak commercial building and utilities work in 1980 is expected to be offset by some renewed strength in the housing market, and then a weak housing outlook beyond 1980 is expected to be offset by a revival in the utilities and commercial building markets.

In our forecasts, we have deliberately separated the outlook at 1982, for the simple reason that after 1982 there has to be a need to make assumptions about the initiation of work relating to a major natural gas pipeline project, which in terms of our construction economy is going to put a big blip on the growth curve. We are assuming that this project will get underway in late 1982. There will be substantial construction work associated with it during 1983. That is going to bump the construction real-growth rate up to about eight percent a year rate for a year or so. Then it is going to taper down as the project peaks, and gradually winds down to completion.

On a net basis, what these comments add to is that real volume in construction in Canada in 1985 is expected to be about 25 to 30 percent more than appears to be the case during 1979. From the point of view of your own interests, the outlook for commercial and residential building work in Canada is for an increase in contract award volume in 1980, with a decline seeming to be the prospect for 1981-82, and then not very much change after that. This pattern reflects largely what we see in the residential area. At the moment, we are expecting housing starts in Canada to come back to a rate of about 200,000 units a year in 1980 and '81, but

after 1981 there will be a fairly steady and moderate decline to a level of about 220,000 units a year by 1985. That is to say by 1985 we will be right back to where we are today.

This situation in the housing market reflects expectations for declining rates of growth in both family and nonfamily formations in Canada, with some of the easing down of growth rate of family formations reflecting little likelihood of any strength in the housing market arising from Canadian immigration, given the relatively high unemployment rates which exist in Canada.

Now, what does the forecast add up to in terms of substance? Obviously, with the real gain in construction volume of 25 to 30 percent between 1979 and 1985, employment in the construction industry will rise over this time frame, but hopefully at a rate somewhat less than the volume gained, with that hope being contingent upon some productivity performance, the kind of performance that we have not been able to observe for the last four or five years. More significant than just the global levels of employment is the pattern of strength (or otherwise) of employment in relation to the collective bargaining calendar, which at this time will bring about another major bargaining round during 1980. Looking to 1980, it would appear that the employment outlook for that year is likely to be very much better than was the case during the last bargaining round of 1978. This could generate some pressure towards higher wage settlements than were realized in 1978, unless the inflation outlook improves dramatically.

This is a simple view of the world, but the real world is much more complex than that. For viable wage bargains to be established in the construction industry, both management and labor will have to take into account substantially more information on what is happening both within the industry and without, that could affect the industry's potential performance,

than just how strong or weak is the employment situation or what was happening last month to the Customer Price Index.

The forecast which I have presented obviously assumes the continuation of certain so-called institutions in the construction business, a key one of which is the practice of quoting fixed-price contracts on construction projects of moderate duration. With the up-and-down pattern of inflation that has plagued us during the 1970's, owners have had increasing difficulty in developing confident estimates of the cost of their proposed projects. Contractors bidding fixed-price contracts; in such an environment are very close to playing what can only be described as "russian roulette."

Yes, if this institution of fixed-price bidding were to become the victim of circumstances in which we find ourselves, the obvious uncertainty that is absence would generate in the investment decision process has to be regarded as a cost increase for undertaking construction work. And that can only result in the construction volume being less than would otherwise be the case.

Another factor that emerges from the outlook is that there is going to be a substantial shift in the composition of the construction market in Canada, with proportionately less of that market originating from building work, and proportionately more of that market originating from engineering work. As a percentage of the total construction market by 1985, as compared to a current share of 42 percent. This is a signal that growth prospects for building in general and special trade contractors and all the distributor supply mechanisms which are in place will be below average. Conversely, growth prospects for heavy engineering contractors will be better than average.

These patterns are likely to be reflected in shifts in relative profitability between various components within the construction industry. That a profitability shift will result in more by way of construction resources

shifting to heavy engineering type work and away from building construction work. In what time I have had, I have attempted to sketch out for you where we are in Canada as it relates to construction, and where we might be going over the next few years. I have deliberately been long on descriptive comments, and somewhat short on statistical razzle-dazzle. The numerical data underlying my comments are available, and I will make them available to the Association staff. I have attempted to take a shot at some of the implications underlying the construction outlook in Canada, largely in the belief that the real issue in corporate planning is not solely the statistics, but what it means by way of organizing for profitable growth. If I have been able to provide some guidance to you in that respect, then I feel that my efforts have been expended in a productive way.

Thank you very much.

ISSUE: 1980 - 1985 Economic Outlook for the
Mexican Construction Industry

by

Dr. Oscar Ruffat

Dr. Oscar Ruffat is Economist for Latin American Projects of Wharton Econometric Forecasting Associates. A native of Chile, he holds a Master's Degree in economics from the University of Chile and a Ph. D. in economics from the University of Pennsylvania. He has taught at the University of Chile, in Peru, and at the University of Pennsylvania.

In his current position, he monitors and forecasts the Mexican economy through the use of econometric models. He also serves as a consultant to government and private industry in Mexico and the United States.

I want to thank the A/C Pipe Producers Association for inviting me here today. The projections that I will discuss come from the Wharton model of the Mexican economy. With this model we have been continuously modeling, simulating and forecasting the behavior of the Mexican economy for about ten years.

The model forecasts roughly the behavior of about 450 to 500 variables, but do not fear, we are not going to discuss the 500 variables. I will instead concentrate on a few variables, three or four, and hopefully bring up some questions that I think are of some relevance to the A/C pipe industry.

I would like to say from the beginning that my presentation today will be somewhat different from the ones that you have heard from Mr. O'Connor and Mr. Nevin, in at least two ways. In the first place, it is an outsider's look; I am not in the construction industry. We monitor the economy at a very aggregate level, so in that respect I will not go into the details of the construction industry. Secondly, I think I bring a brighter outlook for the economy than the ones that we heard earlier on the United States and Canada. And I am sure it is a brighter one than the one we might hear today for the OECD countries.

I think that it has been also very fortunate that I have been preceded today by an outlook on the U.S. economy, since the Mexican economy has, like most of our less-developed economies, is closely linked with the performance of the world economy. Our first intuitive guess as to what the Mexican economy will be doing in the near future would also be a gloomy picture.

In this projection, (slide not available for proceedings) we can see what the growth rate for the Mexican economy has been since 1965 and through 1978, and what if forecasted through 1983. In a few more minutes, I will be a little bit more daring and I will make some projections through 1990..

The point that I want to make with this graph is, looking at the historical figures, to call your attention to the slump in 1971 in the GDP growth rate, and again in 1976. The slump in 1971, which is the one that allowed us to predict a slowdown

again in 1983, is due to what we call in Mexico the so-called "political cycle." Every six years Mexico goes through a transition of government that means that most of the public administration, particularly the upper echelon of the administration, are replaced. This means that all the decisions for spending are slowed down, and that is the reason for that slowdown in 1971 and in 1976.

The slowdown in 1976 was a very severe one, and it was actually the most serious economic recession that Mexico has had in the postwar period. That was compounded in '76 and '77 by both the Presidential transition from President Arrija to Lopez Portillo, and by problems that were slowly developing through the 1971-1976 period.

A part of those problems had to do with the world recession that took place at the same time when the Mexican economy was trying to "beef up". President Arrija went into a very expansionary public policy trying to prevent the slowdown in the world economy, trying to isolate the Mexican economy from the world recession.

The problem then was that at the end of 1976, there was a very severe problem in the balance of payments. I think this is a very important point that we should keep in mind, because it has some bearing on the forecast. That deterioration in the balance of payments, as is captured there in that graph (slide not available). An economy that historically had a deficit below one billion dollars almost tripled by the end of '75 and 1976. The slowdown helped to bring that deficit down in 1976 and 1977.

Another measure that also was taken at this time was the devaluation of the Mexican peso that had been fixed since the 50's. It went from 12.5 pesos per dollar to slightly over 20 pesos per dollar. The inflation rate went up dramatically, and unfortunately we cannot superimpose one graph on top of the other, but these are practically the other two sides of the same coin.

The issue that I want to raise just by looking at this historical data is why is it that we expect a rosey or a favorable picture for the Mexican economy, when

the outlook for the world economy is so gloomy. Well, the answer is basically that Mexico has been blessed with one of the world's most vast reserves of oil. Just to give you an idea of what it is that we are talking about, just in the past twelve months, Mexico has updated its aggregate oil reserves from 14 billion barrels at the beginning of 1987, to 20 billion barrels of oil in September, 1978, and in February they were officially brought up to 40 billion barrels of oil.

There are doubts among some people as to whether the 40 billion figure is actually a hard number. But there is no doubt in anybody's mind that Mexico could be sitting today on top of the largest oil reserves in the world.

Even though we might have doubts about why the speed at which this number of proved reserves has been brought up so fast, whether they are real proved reserves or not, it does indicate something, though. It seems to me that the reason why these numbers have been updated at this pace is basically for two reasons; one, for internal consumption and two, for external consumption. For internal purposes, it calms down the conservationists that want to keep the oil resources down for future generations. For the external world, it improves Mexico's credit rating in the financial international markets. The only reason why it seems to me these reserves have been updated the way they have been is because Mexico, in spite of the fact that until today they have been sticking very closely to a very conservative expansion of their exportation of their oil resources, they are going to come up with a very aggressive exploitation of their resources in the next ten or fifteen years.

I would not be surprised if, by the end of 1990, Mexico is already exporting close to three million barrels of oil per day, or close to four. Now, what this does to the economic outlook is to basically allow Mexico to isolate itself and solve a problem that most of our lesser developed countries have, that is as soon as they accelerate the pace of their economy, they are ahead with the problem of the balance of payments.

The most important point to keep in mind when we are looking at the Mexican economy down the road, is that Mexico will be able to accelerate its growth path,

regardless of the pace at which the world economy is moving. This is due to simply the availability of oil. Let me remind you that the projections for oil requirements today in the world are being made on very conservative assumptions, which talk about three percent growth rate through the 90's, so I do not think Mexico will have any problems finding buyers for its product, for its oil in the world economy.

The outlook that we see for the Mexican economy is one of very high growth rates, similar to the ones that Mexico has experienced in the past. They are in the seven percent range. Those are real growth rates. For those of you who have been monitoring the U.S. economy, the Canadian economy and the European economy, they sound like numbers that are out of scale, this is our projection:

The oil policy will be a very important building block for this expansion program. The growth rates for the construction industry, will tend to oscillate as was indicated earlier by Mr. Connors. They tend to oscillate together with the growth rate for the economy as a whole. They also tend to fluctuate much more dramatically in the downturns, the construction industry tends to drop substantially faster than the economy as a whole. For the construction industry as a whole, we see growth rates around 7.5 percent and 8 percent. The unfavorable side of the forecast, which I think is of relevance here, is the price picture. Even through some noticeable improvement has been made in the past two years with a very moderate and conservative policy pursued by the Mexican Government, we think that the Lopez Portillo administration and the coming administration, after Lopez Portillo, '83 to '88, will have almost an impossible task to bring the inflation rate below the ten percent through the end of the decade.

With this expansion program, Mexico is going to pursue the aspirations that these new riches have brought into the Mexican population. The tremendous social and political problems that Mexico faces today will make it very hard to impose very conservative wage and spending policies in Mexico. It is unrealistic, we think, to conceive of inflation rates below the ten percent level in the next years. The inflation rate, we think, is going to slow down gradually through 1983-1984, and then it will

stay there in the ten to twelve percent range. The figure for the construction industry, those are growth rates by the way, we expect to remain consistently above the GNP deflator.

Summing up the thoughts that I would like to leave you with is, first, that the foreign gap will be nonexistent for the Mexican economy and we can safely expect for very high growth rates in Mexico. The gross fixed investment will play a very important role in this growth path in Mexico in the next 12 years, and the construction industry is the most important component of gross fixed investment. This picture for the construction industry as a whole, it looks like a very favorable one in Mexico. Particularly important are going to be transportation construction and industrial construction. Inflation will be a very undesirable partner for the years to come, and those of us who have lived with high inflation rates in the 20 percent or 30 percent level have observed that it is not only the rate at which inflation is developing, but also the distortions that procure in the price system, that are very important to monitor.

The inflation rates that we are talking about are most likely to bring big shifts in the price system and in the composition of investment in the next few years. I would not be surprised if, contrary to what you have seen in the case of the United States, you could expect the construction industry or the housing industry, just as a shelter for inflation, to move in the opposite direction to what everybody would expect, perhaps even to pick up, as has happened in Argentina or Chile, or in Brazil in the early parts of inflationary periods. The second point is that construction will increase its share in GNP, and third, that about 50 percent of the Mexican population today is below 20 years of age. It is a very young population, there is a significant level of unemployment, and bad income distribution.

So the other side of the development of oil resources is the question of what is going to be done with those resources. It seems to me that a most important priority that the Mexican government will have to take care of in the near future is the solution of urban problems such as low income housing in urban areas such as Mexico City.

Thank you very much.

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ISSUE: 1980 - 1985 Economic Outlook for the
European Construction Industry

by

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Mr. Slavich has a Ph. D. from the Sloane School of Management at MIT, and an MBA from the University of Pittsburgh, he is also an Electrical Engineer.

I want to discuss the economic outlook for the construction industry in Europe. I thought perhaps the best way to begin would be to put it in perspective by comparing Europe to North America. You can see on Chart 1 that the GNP of Europe and that of North America do not differ markedly, with North America slightly ahead. Europe has a slightly larger population, indicating that the GNP per capita in Europe is slightly smaller than that in North America.

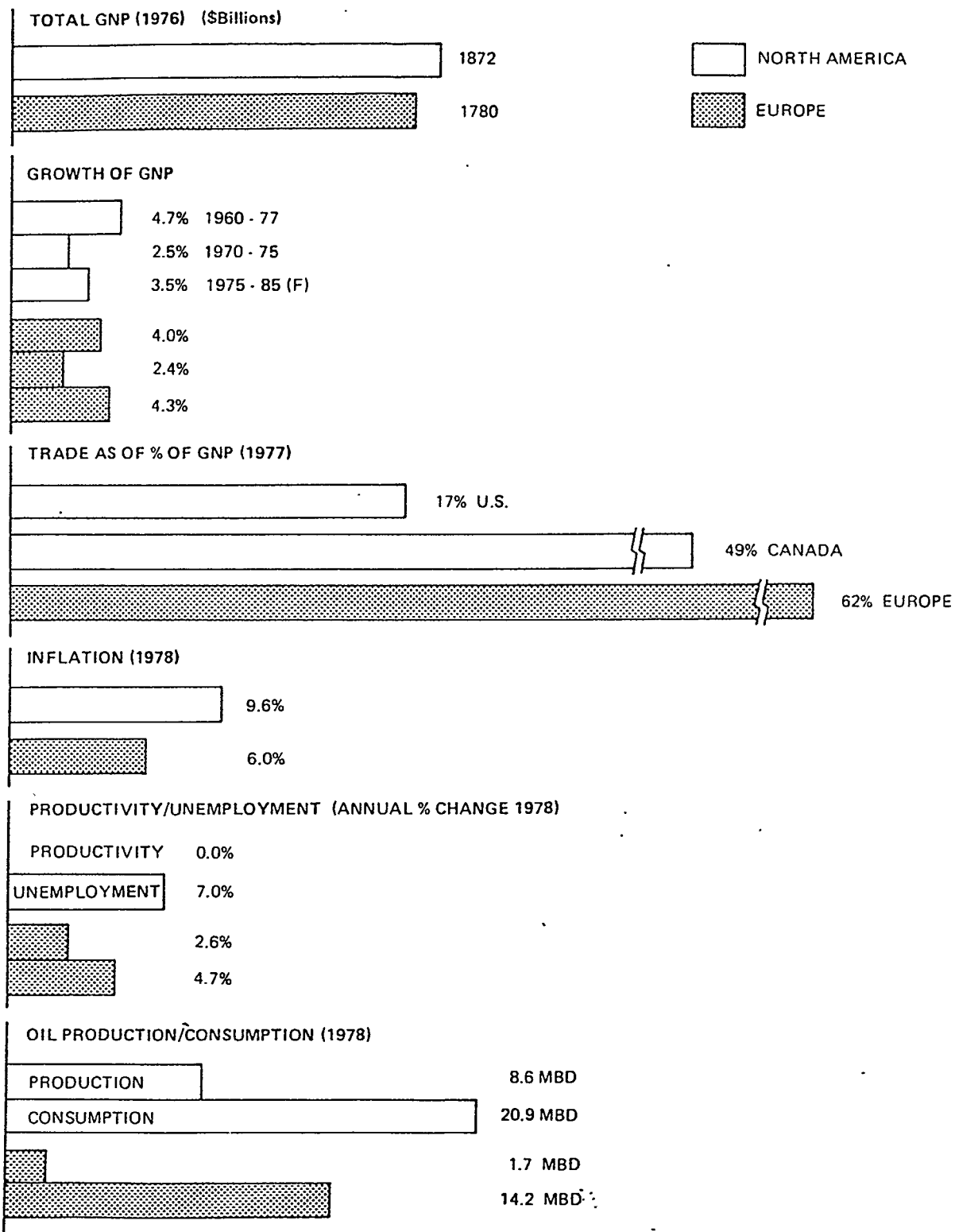
You'll see some interesting figures on the rate of growth of the economy. North America was significantly ahead of Europe in the period 1960 to 1977, but the difference in growth rates closed rapidly in the 1970 to 1975 period. And I think, perhaps, looking ahead that Europe might grow faster than North America in the immediate future, that is, the 1980 to 1985 period. We'll touch on some of the reasons for that in a moment.

Trade is a much more important component of the economy in Europe than it is in North America, particularly relative to the United States. The trade statistics for Europe reflect the smaller sizes of the countries and the much larger inter-country trade within Europe as a whole, and I think that is a trend which will continue. Partly reflecting this trend is the productivity experience, where the United States had a zero rate of productivity increase in 1978, while Europe experienced something like a 2.6 percent rate.

World Trends

I'm going to review the European situation in general, but first, I would like to touch on some world trends, which I think are going to affect the European situation, and the U.S. as well. I think that we have to understand these -- what I'll call global trends -- to put Europe in perspective. Also I think this brief review will provide you with an opportunity to assess my particular economic perspectives.

CHART 1
EUROPE VS. NORTH AMERICA



Sources: WORLD BANK, IRVING TRUST, AND IMF

Many important economic trends can be singled out, but the principal one is the substantial reduction in the rate of economic growth during the 1970's relative to the 1960's. The reduced growth rate has been experienced by almost all developed countries and by almost all undeveloped countries as well.

In this regard, Europe has been hard-hit. This can be seen on Chart 2, listing the real gross domestic product growth rates for the European countries. Without exception, the growth rates in the mid-1970 period were lower than those in the 1967 to 1972 period. And with but one exception, the growth rates in the 1980 to 1985 period, which I've been asked to focus on, will also be lower than during 1967 to 1972 period. A number of trends can explain this overall reduction in economic growth.

First, there is a reduced rate of population growth, which results in reduced rates of economic growth, but of course not necessarily a reduction in the per capita economic growth. The second is another obvious reason and that is the increased price and the reduced availability of energy, which has contributed substantially to the increased productivity of all economies since World War II.

The third is a shift toward service industries, which do not lend themselves to economies of scale or to large productivity increases. The fourth, an obvious one, is inflation, mentioned by previous speakers, which discriminates against capital formation and adds a considerable measure of uncertainty and therefore, discriminates against economic growth.

The fifth and final one has also been referred to by previous speakers and that is the increased participation by governments in the economy, particularly the increase in government deficits, which divert funds from productive investment, and the increase in government regulations, which retard and in many cases actually prevent productive investment.

CHART 2
REAL GDP GROWTH

	1967-72	1973-77	1977-78	FORECAST 1980-85
AUSTRIA	6.0	3.6	5.0	4.5
BELGIUM	5.5	3.3	3.5	4.5
DENMARK	4.7	1.6	5.0	4.0
FINLAND	6.1	2.4	0.6	4.0
FRANCE	5.1	3.2	4.0	4.5
GERMANY	5.4	2.3	3.9	3.5
GREECE	8.1	3.8	4.8	6.0
ITALY	4.3	3.0	3.7	4.5
IRELAND	5.3	2.3	3.2	5.0
NETHERLANDS	5.8	3.0	3.6	4.0
NORWAY	7.9	4.7	4.9	5.0
PORTUGAL	6.9	4.0	6.4	5.5
SPAIN	6.5	3.8	2.3	5.0
SWEDEN	3.5	1.4	-0.7	3.0
SWITZERLAND	4.7	0	1.0	3.0
TURKEY	7.1	6.5	6.5	6.5
UNITED KINGDOM	2.5	1.8	2.4	3.0
YUGOSLAVIA	6.7	5.2	3.6	6.0
CANADA	5.3	3.9	3.8	4.5
UNITED STATES	3.1	2.7	4.8	3.0
WESTERN EUROPE	4.9	2.3	3.6	4.0

SOURCE: IMF

Europe in general has had a good measure of all these factors tending to reduce its growth. You'll find some exceptions, examples which indicate that countries have dealt with these issues differently and therefore have resulted in different economic growth rates.

Economic Bananaskins

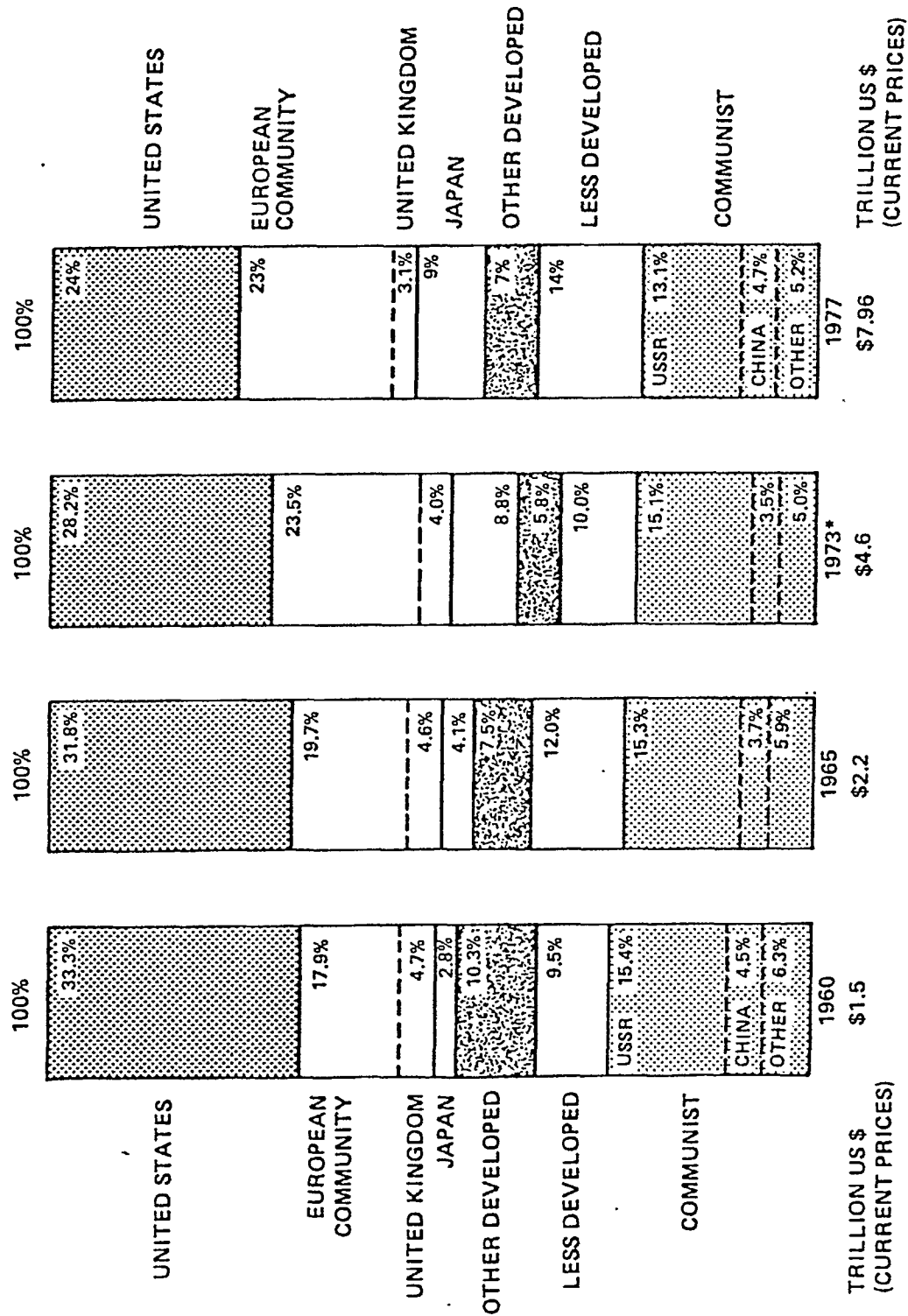
Another important factor in the economic outlook for Europe is what I refer to as "economic bananaskins." These are economic imbalances that confront all the world's economies and must be addressed through economic policy making. Europe is no exception in this case. First among those imbalances, or bananaskins, is the differential rate of economic growth among countries of the world.

I refer you to Chart 3, which shows the breakdown of world GNP into major economic sectors. For example, the European Economic Community has increased its share of world GNP from something like 18 percent in 1960 up to about 23 percent in 1977. While, for example, the U.S. has declined from a one-third participation in world GNP in 1960 to something like a 24 percent rate today.

This situation results in relative shifts in political power, and geopolitical strains develop. I think Europe is clearly feeling these effects. The U.K., for example -- I've singled that out on the diagram -- has declined from almost a five percent participation to a little bit over a three percent participation.

West Germany, on the other hand, has had exactly the opposite experience. I haven't singled it out, but it would be the mirror image of the U.K. As a result, a shift in economic power, and therefore political power in my judgment, has occurred from the U.K. towards the West German and French axis.

CHART 3
WORLD GNP



SOURCE: ECONOMIC REPORT OF PRESIDENT

Also, some of the southern European countries, such as Spain, Greece, Turkey, and Yugoslavia, have been growing relatively stronger in economic as well as political terms. As an aside, I would also mention that even during the difficult periods of the 1970's there have been some countries, which I refer to as the rapidly growing middle-income countries, such as Mexico, Korea, Taiwan, Singapore, Brazil, and in Europe, Spain, Turkey, Greece, and Yugoslavia, that have been growing very rapidly, despite these problems.

I think if you look at some basics, to try to explain why this has happened, you'll find that they all have strong central governments and market-oriented economic policies.

What are some of the other economic bananaskins? One is what I call extreme participative democracy. That is where interest groups, small minorities, can block or have a virtual veto power, over government policies fostering economic progress. This development has occurred at the government level as well as the institutional level. You can point to examples, such as Italy and the U.K., where this has been pushed to the extreme, making the economic development extremely difficult.

The third imbalance is one that we are all aware of, and that's trade imbalances. There are significant deficits throughout the world. Within Europe there is quite a mixed picture. We are all aware of Germany's very strong trade surplus. On the other hand, there are countries like Belgium, until recently, the United Kingdom, Denmark, Ireland, the Netherlands, all experiencing trade deficits. The U.S. of course, has a very large and growing trade deficit.

While one of the main contributors to this deficit is oil, another problem that is not frequently mentioned is that many of these imbalances are the result of excess consumption, at the expense of investment. Further,

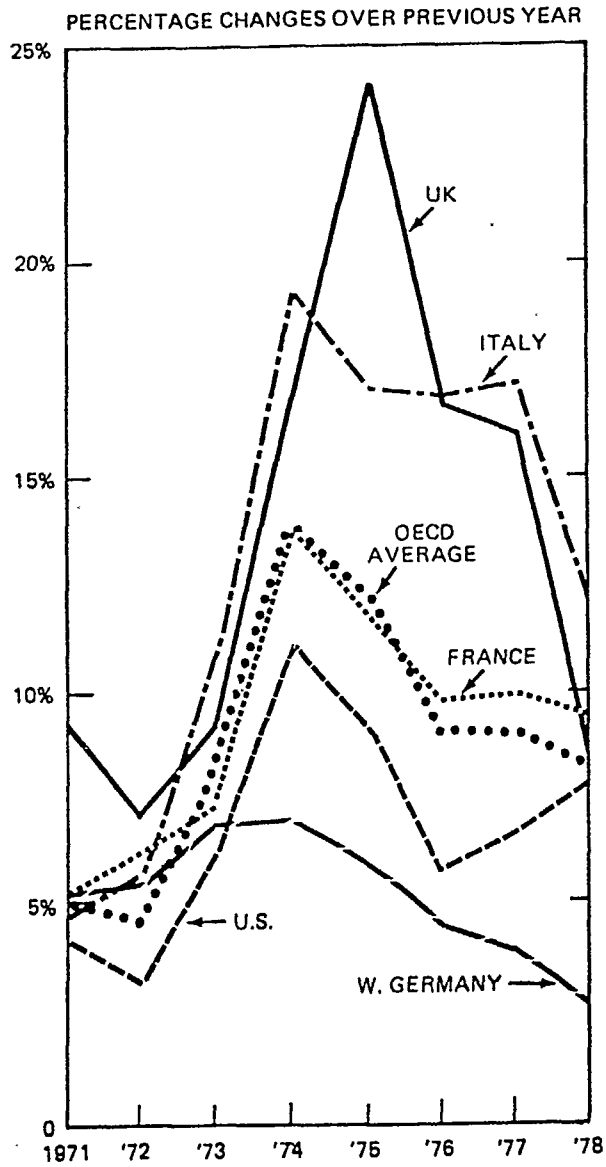
the countries that are running the surpluses are not typically reserve currency countries, so that these countries are having to accumulate large foreign currency balances. This presents a particular problem, because investors in these countries do not want to hold their savings in a foreign currency. Therefore, the governments themselves have to intermediate and hence the term "recycle," which has resulted in the rapid growth in the Eurodollar market. This, I think, is also one of the pressures that is pushing Europe towards the adoption of the European Monetary System, which is the old currency snake, consisting of the BENELUX countries, Denmark, and West Germany, joined by France, Ireland, and Italy. Norway dropped out for its own particular reasons, and the United Kingdom, has not made up its mind whether or not to join.

The EMS is a development that could help integrate the European economies and would, in my judgment, help those that are most able to compete within a larger market. I don't think this development is likely to come quickly, nor will it be a major factor in feelings, which will work against this economic integration.

Another economic bananaskin is certainly inflation, which has to be mentioned as a major economic imbalance. On Chart 4, there are some inflation statistics with rates going up to as high as 25 percent in the case of the United Kingdom. While the levels shown are unacceptably high, the direction of movement is in the right direction. There are some exceptions to the inflationary syndrome, West Germany and Switzerland being outstanding examples, where those countries have taken actions to limit inflation. Those actions have received broad support within their economies.

An important point to stress, which is of particular importance to us here, is that inflation discriminates against capital intensive investment.

CHART 4
CONSUMER PRICES



Source: OECD

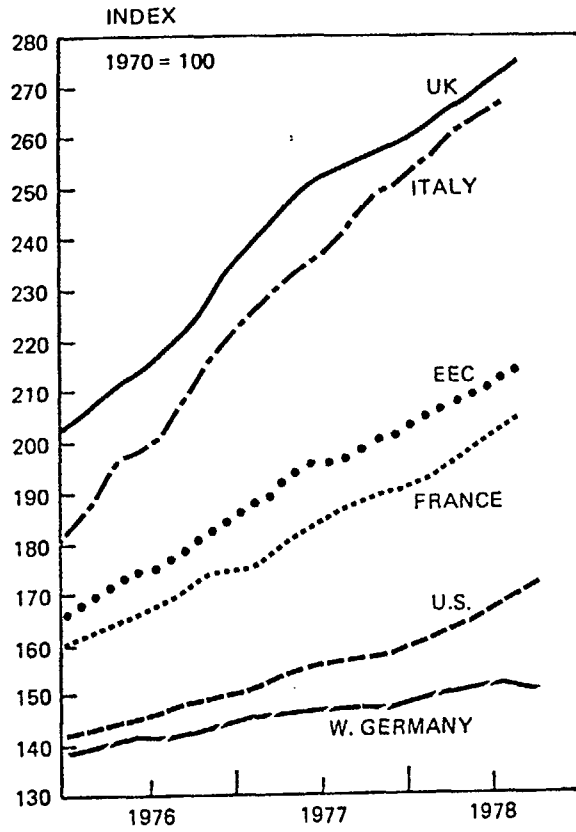


Chart 5 plots GNP growth against inflation for two time periods. Of course, the intent of economic policy should be to try to move from the lowest righthand corner to the upper lefthand corner. With few exceptions, the year 1978 was fairly favorable in this regard, and I'm hopeful that this is a trend that will continue.

Another imbalance is clearly the energy situation. And in this regard, we have just heard that Mexico should be benefiting substantially from this. Recently, North Sea oil production has had quite an effect on Europe, helping the U.K. especially. I think that the significant differences in growth between, for instances, Norway and Sweden, can be explained as a result of the North Sea oil impact on Norway.

Also, we have countries like France and Spain adopting ambitious nuclear power programs, which will benefit them in the future.

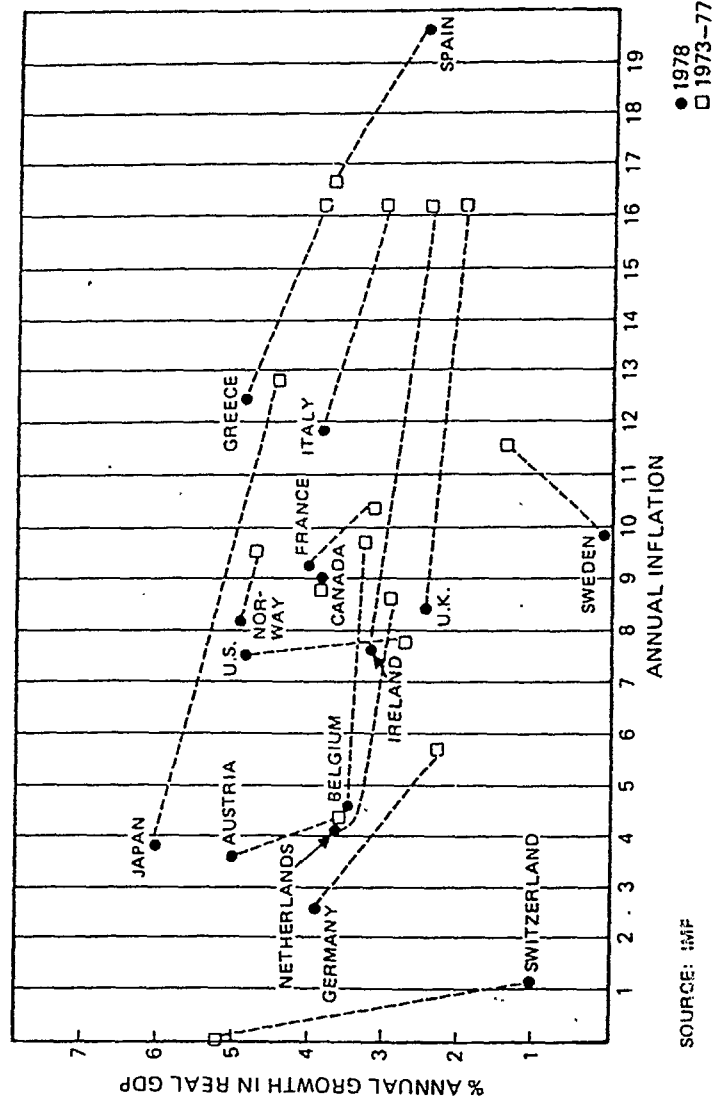
To summarize to this point: what I've described is an atmosphere that raises some concerns. The period of the 1970's has been marked by negative forces -- inflation, energy constraints, government regulations, and monetary problems, resulting in an overall slowing of world growth.

A number of important global imbalances exist that will have to be dealt with by these individual countries. The outlook for economic growth will depend on how successfully each of the individual countries deals with these issues.

Capital Formation

The important point for us here is that construction spending, or capital spending, is critically tied to the outlook for the economy. Judgments by decision makers, based on the economic outlook will determine the level of construction spending, and consequently the rate of increase in productivity and ultimately, economic output. We are talking about a very important decision, about one that is susceptible to adverse developments

CHART 5
REAL GDP GROWTH VERSUS INFLATION



that accounts for the dramatic swings which occur in capital spending, and hence growth, in individual economies and also across economies at any one time.

On Chart 6, data for the capital investment by country as a percentage of total GNP are given. The numbers range from a low of 16 percent for the United States to a high of 36 percent for Norway. That latter number shows the impact of oil development on its relatively small economy.

Most countries invest in the order of 20 to 24 percent of their annual output in capital spending. Generally speaking, those countries with high investment rates also have a high growth rate. The fit or the correlation is not perfect for many reasons, one of them is that you cannot compare a couple of years of capital spending to growth rates. But certainly growth is related to the accumulated investment over a number of years.

The important consideration is that capital spending has been lagging almost universally in the 1970's. On Chart.7, the rate of investment for this business cycle is shown. All those countries shown, with the exception of Canada, have been lagging behind the average of previous business cycles.

The trend is clear: capital spending is lagging badly, and it has not recovered to the pre-embargo rate, even after four years. Usually the recovery comes after a year to two. The outlook then is for lower economic growth rates in the 1980 to 1985 period in Europe.

West Germany and the U.K.

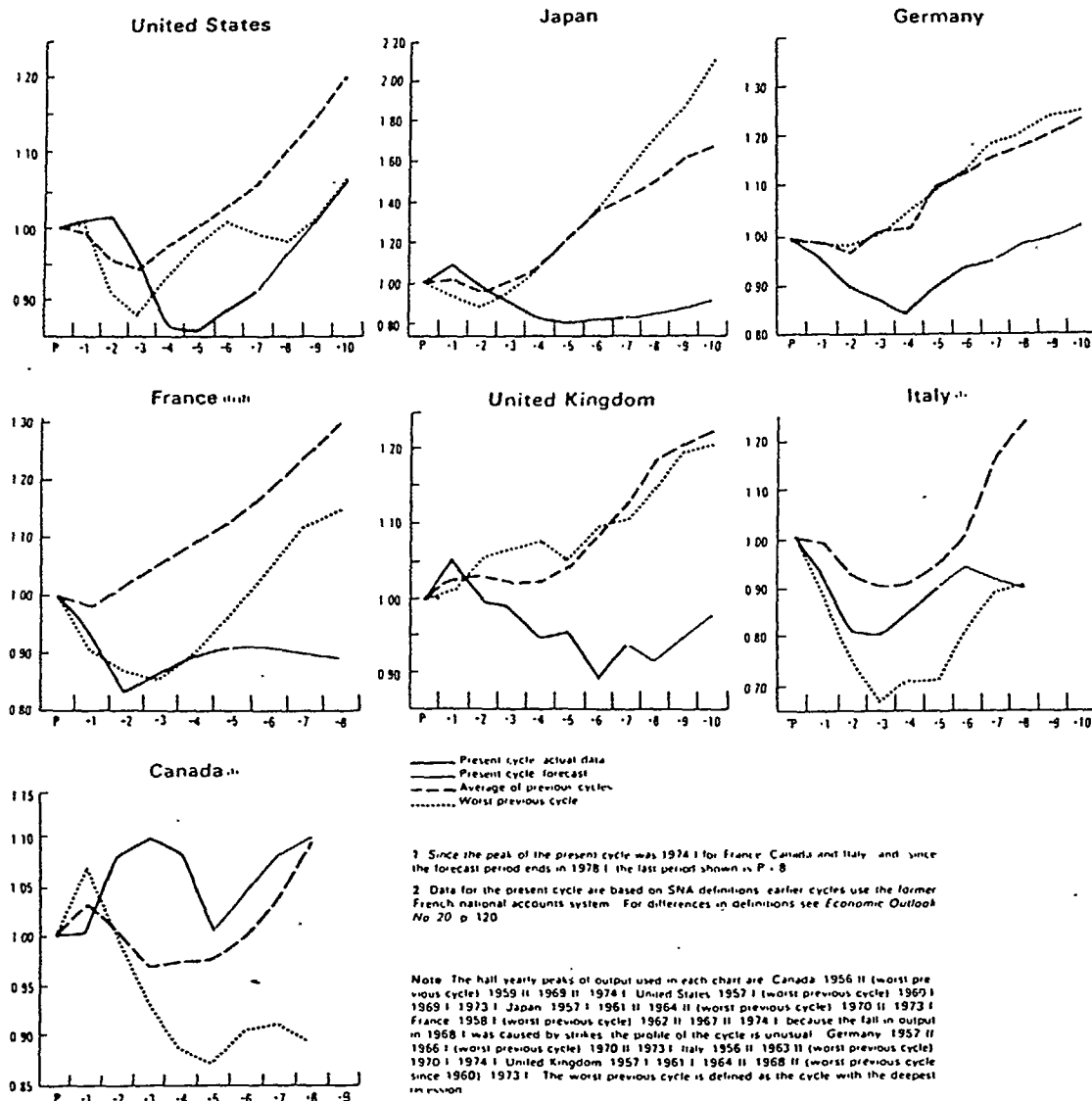
Let's look at some specific European countries. I want to focus on two, West Germany and the U.K. Both have similar goals, that is, increased economic growth and reduced inflation, but the results that the two countries have achieved have been substantially different.

CHART 6
CAPITAL FORMATION
(% OF GDP AT CURRENT PRICES)

	1976		1975	
	TOTAL	RESIDENTIAL AND NONRESIDENTIAL STRUCTURES	TOTAL	RESIDENTIAL AND NONRESIDENTIAL STRUCTURES
AUSTRIA	26.0	15.4	26.7	11.1
BELGIUM	20.6	12.8	22.0	14.2
DENMARK	21.5	12.3	19.9	11.9
FINLAND	27.0	16.5	30.2	18.5
FRANCE	23.1	14.1	23.4	14.2
GERMANY	20.7	12.3	21.1	11.2
GREECE	21.5	13.1	21.0	12.6
IRELAND	24.5	14.0	22.3	11.8
ITALY	20.3	11.7	21.2	12.4
NETHERLANDS	19.7	11.6	21.3	12.0
NORWAY	36.3	22.4	35.4	21.6
PORTUGAL	23.9	17.0	13.6	15.9
SPAIN	22.9	13.7	23.2	14.0
SWEDEN	20.6	11.9	20.7	12.3
SWITZERLAND	20.7	14.0	24.0	—
TURKEY (1973)	17.9	9.5	16.9	9.1
UNITED KINGDOM	19.2	10.6	19.9	11.1
CANADA	23.1	15.5	24.2	15.8
UNITED STATES	16.2	9.4	16.3	9.4

SOURCE: IMF

CHART 7
CYCLICAL BEHAVIOR OF NON-RESIDENTIAL INVESTMENT
 (Half years, Volume Indicates Peak 1.00)



Source: OECD OBSERVER

We are well aware of the remarkable performance of the German mark, and I think that can be explained by Germany's stress on low inflation over other elements of its economy. That is, they stress inflation at the expense of employment and real growth. You'll find that in Germany the real growth has slowed down to an average rate of about three percent during 1973 to 1977, relative to a 5.4 percent pre-embargo rate.

Also, there is a very strong consensus within Germany favoring anti-inflationary moves, and labor is a member of this consensus. I think that this is a point to emphasize. Institutional attitudes are extremely important in terms of favoring growth and working against inflation.

Recently, Germany has agreed to boost its economy with tax cuts, and this will result in a slight drop in the savings ratio, a slight rise in consumer prices, and more importantly, an expansion in private consumption and capital spending. But regardless, the current mood is conservative, and Germany will be willing to sacrifice growth in favor of keeping a check on inflation.

Within this view, then, the outlook for capital spending in Germany is mixed. Although the economy is strong and has led Europe in the last decade, growth is projected to be below the current level and below the rates experienced in the 1960's. The outlook for capital spending is expected to follow a similar course and result in a very competitive situation within Germany. I think you will also find Germany extremely aggressive in foreign markets, as a result.

What's the situation in Britain? Most recently, Britain has tried to adopt some of the policies adhered to by Germany, and they've achieved a remarkable decline in the inflation rate over the last three years. Inflation declined from something like 24 percent in 1975 to about 9% in 1978. The price paid to achieve this decline in inflation was

substantial. The real growth of GDP has been one of the lowest in Europe, and currently is about two and a half percent a year. Gross fixed investment, or capital spending, is recovering much more slowly than previous cycles (see Chart 7). Recently, though, government expenditures have been reduced, and investment increased about two percent in 1978.

Also in the last two years, the British have undergone a reduction in the growth of consumption and actually a reduction in per capita living standards. Most remarkable of all, a liberal government was compelled to cut back government spending and transfer payments. Both had grown to the point where they absorbed much of the savings generated by the private sector and produced disincentives to invest.

Unlike the German situation, up to this time there was no consensus, particularly in labor, to support anti-inflationary moves. The election this Thursday will indicate whether or not there is indeed a trend toward a more fiscally conservative mood in the U.K. While the North Sea oil is beginning to pay off for the U.K., capital spending as a percent of GNP is the lowest in Europe.

The U.K. is expected to continue in this trend, and as a result, economic growth is expected to be about three percent over the 1980 to 1985 period, again, the lowest in Europe. The outlook for construction spending is therefore not good, but some improvement in performance is expected.

Success Stories

Finally, I'd like to comment a moment on some of the real success stories in Europe. What I am referring to is some of the middle-income countries in Southern Europe, including Greece, Portugal, and Spain. Here we have expected growth rates of five percent or higher.

I'd like to single out Spain as an example. Spain is already becoming a formidable competitor in certain industries, such as automobiles and commercial vehicles, steel, and shoes. The next five years will be important for Spain, as it tries to democratize. The first hurdle will be the entry into the EEC, which should take about a five year process. But the first two years are critical, since their trade barriers will have to be reduced.

Thus, Spain is at a turning point economically and politically. The inertia, I believe, is towards integration within the EEC, with a strong industrial potential. Also, Spain is currently the U.S. Eximbank's largest borrower, and it is one of the top borrowers in the Eurodollar market, indicating to me that bankers are optimistic about Spain's future.

Spain has benefited, in my judgment, from strong political control and the introduction of market forces into the economy. A potential risk is a combination of diverse small political parties with political extremist groups. On the other hand, the entry of Spain into the EEC should open up a large market for Spain's efficient industries, especially steel, shipbuilding, textiles, shoes, and also Spain's agriculture, which should benefit when its agricultural prices are brought up to those of the EEC.

Spain has a high ratio of capital formation of GDP, thanks in great part to foreign loans, and I expect this to continue. So overall, Spain despite current political problems, is expecting to be one of the growth leaders of Europe and should represent an outstanding and growing market for construction spending.

Conclusions

I come to three conclusions when looking at Europe as a whole. First, the future growth in Europe will be in the area of about 4 percent

annually, in gross domestic product, as compared with approximately a three percent growth for the United States. There will be wide differences among the countries in Europe, with a general uptrend during the 1980-85 period, as compared to the 1970's.

Secondly, I expect high-growth countries to be in Southern Europe, except for Norway, those being Spain, Portugal, Greece, perhaps Turkey. Countries such as Germany and France will not exhibit these high growth rates, but because of the size of their economies and markets, and because of the expected growth in the 3-4 percent range, they will represent probably the best construction markets, but not the most rapidly growing.

Finally, the most critical factor, I think, is what is called the social contract. That is, will there be a consensus within these economies supporting those policies, such as market-oriented policies and anti-inflation policies, necessary to encourage a vigorous construction industry.

SPECIAL PRESENTATION: Markets for Large

Diameter A/C Pipe in Europe

by

Jean-Jacques Bogaerts

Mr. Bogaerts is Commercial Director for international and domestic operations in the A/C Pipe Division of Eternit, S.A., Belgium, a position he has held for the past ten years. He is a graduate of the University of Brussels with a Master's degree in economics and finance. He worked for a brief period of time with the Belgian Federation of Employers, which is the equivalent of our National Association of Manufacturers. He then joined Eternit of Belgium, and has been with Eternit for the past 21 years.

I'm grateful to the A/C Pipe Producers Association that an occasion was given to me to speak about the approach in Europe, especially in Belgium, to large diameter asbestos-cement pipes. It is clear to us that asbestos and health is an important aspect of survival for A/C pipes, and we must, of course, carefully follow its development, and try to have it completely under control.

But another point, I guess it is my personal approach, is no less important for survival. It is the fact that if we want our machines producing, we first have to sell the production. The export possibilities to developing countries, with worldwide competition, is primarily in water distribution pipes in small diameters from 80 mm, (three inches) up to 500 mm (20 inches). Other richer countries, ask for pipes up to 1000 mm or 1200 mm; that means 40 inches and 48 inches respectively.

It was obvious that we were stuck in our European countries with saturated markets, divided under different competitors. At first, we faced PVC; later on ductile iron replaced grey or, cast iron and to a lesser degree, steel pipe were also claiming their market share.

This situation started in the early 1960's. And so in Belgium, we decided to go into a challenge, and it was a big one because of the very expensive investment in new equipment. Also, we had to think of the marketing, which had to carry into effect the commercial and sales program as compensation for the investment.

In fact, we thought of an explosive entrance in the field of sewage, in competition with, of course, concrete pipe. It was normal concrete, reinforced concrete, prestressed concrete, and that's it. The approach was very special because we thought that in the first place we had to attack right away the biggest sizes. We equipped our machine to production of pipes up to 2500 mm, (100 inches) in five-meter lengths.

And that's a jumbo, believe me, especially when you have to pay back the machinery. That's a big problem for the marketing manager. But it's also a challenge.

So we started into those 2500 mm pipe right away, in a very particular sector of the sewage market. One could ask, "Why not start in 500, 600 and 700 mm sizes?" Well, it was just to prove and to impress the competition with our beautiful A/C pipes. Believe me, they are beautiful. And we succeeded. Then we came down to the normal size sewage pipes.

In Belgium, we have what we call the "unitary system." You have, as you know, the separate system. The unitary system means storm water and waste water all together in one pipe. That's the reason why the market needs big pipe sizes. It's very normal in Belgium to have sewage pipes of 1500 mm to 200 mm. When you compare it to France, there is a difference because they have separate systems and are using smaller diameters.

The entry into the market was not easy. We first tried to convince the consultants. That was an easy way, because it was a talk between engineers. Then we went to the contractors and proposed our own laying teams. So actually we helped them to lay the pipes and to build some sewer lines.

The first years were hard, but for about three years now, we have been doing 10,000, 15,000, 18,000 tons a year in big sizes. When I say large diameter, it means over 1500 mm because a 1200 mm or 1000 mm is not a large diameter for us.

The domestic (Belgium) market is always the best because you can keep everything under control. I hope everybody knows Belgium; that small village in the world; it has a big city, Brussels. Some of our African friends were telling me that Belgium is surrounding Brussels. It's a small

country but we have had our successes. It's unbelievable, but it's the truth: in international markets, with these big sizes, we have supplied already a total of 45 to 50 km. in Libya, in sizes of 2200 mm.

A special application for this particular item is for cooling systems in factories. I'm following very carefully a project in Doha, Kuwait, for a power station cooling system. They asked for 16 km of 2400 mm pipe in competition with steel, with a kind of rubber protection.

We started with sewer lines in Belgium; later on, we succeeded, through the cooperation of the consultants, with another application. When looking through a hole in the ground, we are always thinking, "Couldn't we put a pipe in it?" So we started with the famous jacking system. You know all about it, because of the boring that started in the beginning of the century in the U.S.A., certainly not with A.C., but the system was nonetheless well-known.

After pipe jacking, we also went into the service pipe. I don't know if my translation is good, but a service pipe is a kind of technical "gallery", under the ground. This application resulted from steadily growing traffic in towns. It is getting more and more difficult to carry out repairs on existing mains and cables, because traffic diversions (caused by digging up streets) provoke big traffic jams, resulting quite frequently in the unsettlement of public life.

In addition to this, an efficient plan for the collective laying of various conduits is still completely lacking, so the pavement must be laid. Therefore, it was necessary to eliminate these difficulties for the future, and think of a system that is more efficient.

We think to have found the answer in so-called service pipe. In such a service pipe, the various conduits can be laid collectively. The service pipe allows for carrying out repairs on these conduits at any given time. If necessary, additional conduits can be laid later on without digging up the streets again.

In principle, the following types of conduits can be laid together in service pipe. Certain restrictions have to be observed, certainly, particularly with gas and waste water collection conduits. Within these service pipes, gas conduits for house connections, water mains, water conduits for house connections, electricity feeder cables, electrical cable for house connections, telephone cables, a distance heating may be laid.

It is a marvelous application. It is expensive, of course, but what is expense if the technology is good? I'm sure some of you must know the famous Koenig's Allee in Dusseldorf, one of the most beautiful streets in Europe. I would say it is about 200 m long. It's impossible to imagine that this kind of avenue, with all the first class shops, should be closed for opening up the street to put one main service pipe of 2500 mm. We are still in discussions with the officials of Dusseldorf, and we have a real chance of doing it. Why not? A/C is the best solution!

A distinction has to be made between continuous conduits and conduits for distribution purposes, that means for house connections. This differentiation is logical if one speaks for a service pipe, in which all conduits and cables have been brought together. Without going into details, it can be stated that pipes and cables for house connections necessitated frequent borings through the wall of the service pipe. However, since the total efficiency of this kind of tube fully depends on the character and the number of conduits and cables to be laid, this problem deserves

full attention.

It can be stated that for a new building project, as well as for town expansions, the service pipe concept is a valuable contribution to modern town planning. For my marketing colleagues here present, I would like to tell you that we are in serious discussion for building a total system, together with about 25 American consultants, in the famous FCT town; that means Federal City Territory in Nigeria. I don't know when; perhaps in the year 2000. For me, it's much better to do it now, straightaway, because in the year 2000 I am sure I will think of other more personal projects!

As far as jacking applications are concerned, it is a very clear and simple system of thrustboring. You will see it on the slides later. I have nothing to tell you about that, only that we have made up about 11,000 borings, a normal range of 25 to 30 meters of pipe. That represents a beautiful turnover in that kind of pipe.

We've made some bigger lengths in pipe jacking, over 600 m lengths, with two intermediary stations in the beautiful city of St. Etienne in France. Also, we have made a lot of pipe jackings under two railroads, one highway and one tunnel, in the length of 120 meters, in Belgium.

For another jacking application, the Premetro in Antwerp, the system was so made that we developed a new method, a sort of roof slab construction. You will see it on the slides. I will not go into the technique, but it was a very nice application. We were sole supplier because we came up with the idea of building up the roof with jacking, and then filling them with cement. It's very special, and well-paid. All these things are well-paid; don't forget the point.

So if you allow me, I would like to finish on a well-known marketing notion: "When you create the need in the market, the demand for the product will follow." And we proved it.

ISSUE: Penetrating the Iron Curtain ... Price versus
Performance versus Politics

and

INITIATIVE: A/C Water Pipe ... Price versus Performance
versus Politics

by

Leo J. Horvath

Director, Technical Affairs

A/C Pipe Producers Association

The issue up for discussion is entitled "Penetrating the Iron Curtain". Having served in intelligence work in the past, I shuddered at the phrase, "Penetrating the Iron Curtain," with all its connotations of cold war, barbed wire fences, Berlin tunnels, etc., but the more I thought of it, the better I liked it, and then conceded that it was appropriate, particularly at this point in the A/C pipe industry's middle-age.

Based on conversations and discussions with some of you in the industry, market growth for A/C pipe in the months and years ahead required what I've been told is a hard-nosed penetration of that segment of the water pipe market now dominated by iron pipe. That in a nutshell appears to be the issue.

I could be wrong about that simplified assessment of the issue, and I hope that I am wrong, because I'm not sure we're ready to penetrate the iron market. Until recently, at least from my limited exposure, the health issue appears to have put the A/C pipe industry on the defensive, into such a defensive posture that marketing of A/C pipe, again, in my opinion, has consisted simply of coming in with a lower price.

Don't misunderstand me. In this age of inflation, I'm not knocking lower prices. Nor are the buyers and users of A/C pipe. It is, and will continue to be, one of the main building blocks of the A/C pipe industry's competitive effort. Before going on with this point, I'm going to digress for just a minute.

Yesterday morning we heard a number of excellent speakers cover the primary, and vitally important, issue of A/C pipe and health. The actions taken, and those proposed, to clarify this very serious, and really emotionally-loaded issue. I am sure that you, as producers and also the users of A/C pipe welcome these supporting programs. Emotion needs to be counter-balanced by substantive facts and John Welch and others of you are doing just that.

Parallel with these health-oriented programs, the industry has to back up A/C's low price with an increased marketing effort, emphasizing performance. Low initial price, obviously, can do a lot of selling, but it could also use some support. I was told to ask you if the industry has become "order takers" instead of "order makers"? Well? Have we? I also heard the phrase "antideluvian troglodytes" used the other day and wondered if, in the not too distant future, it might be applicable to the A/C pipe industry. I don't think so, but at times ... I have sensed that feeling of let the other guy or pipe do it, or, a feeling of complacency, we have our share of the market, let's not rock the boat, or, a tendency to take our good A/C pipe customers and users for granted. Obviously, we are not without fault and the competition will use any chink in A/C pipe walls to undermine out present share of the market. That is the name of the game. In turn, we need to resolve our weaknesses and go after theirs.

In other words, while our strategy needs to be directed at competing effectively for a bigger share of the water pipe market, it behooves the industry to improve its present tactics, as well as a strategy, if we are simply to retain our present share of the market. Basically, we need to get our act together.

Along these lines, the Association undertook an evaluation to assess the performance of A/C pipe in use at a number of water utility systems. In spite of a number of aborted starts due to snow storms in February, I did get on my way and the results of our preliminary survey will be reflected in an Association presentation which you will be seeing shortly.

As the new guy on the block, I heard a number of comments from engineers, planners and managers from San Diego to New Orleans comments which support overwhelmingly the perspective that A/C pipe is a performance pipe. Here are a few of them.

The Chief Engineer of a southern California water municipality:
"To meet the corrosive soils of our area, we use A/C pipe, we estimate that A/C pipe will last 75 years or more as against 20 years for unlined cast iron and 40 years for lined cast iron ..."

A statement in the 1978 annual financial report of a water district in Nevada: "Eventually all the cast iron mains that were installed in the water district system up through 1955 will be replaced with new mains ..."

The head of the planning department of that same water district in Nevada commented as follows ... "eight hundred miles of the one thousand miles of our system is now A/C pipe. The soil in the area is highly corrosive and A/C pipe remains unaffected. Due to better flow characteristics, operating costs for A/C pipe are less than for cast iron and A/C maintenance costs are less because of its life expectancy. A/C pipe has been installed since 1956 and is still performing without failure."

An Executive Vice President of a water utility in Arizona: "Initial price of A/C pipe is low, but that's not the main reason why we selected A/C pipe for our system. From an overall point of view, the operation and maintenance performance of A/C pipe is the reason. We take the long term view. A/C pipe is installed and you forget it."

Continuing, he said: "If handled properly during installation, we have no problems of A/C breakage and replacement. Keeping an inspector in the field, rather than at his desk, is one way to avoid problems. Our area soils tend to be corrosive. All other pipe, other than A/C pipe, is systematically being replaced. The flow coefficient of A/C pipe is good at the beginning and this situation does not deteriorate over the years."

A General Manager of a Texas water utility made the following comment "The resistance to corrosive soils is a major reason for selecting A/C pipe for our system."

The Chief of Purchasing of a city water board in Texas: "The initial price of A/C pipe is competitive to the point of even avoiding requests for alternate proposals."

From the Chief Engineer of that same Texas city: "The city water board began specifying A/C pipe materials exclusively in the 1950's. Because of the corrosive soil conditions in the area, the material has proved very successful. However, in small diameter pipe, we continue to experience beam break failures. This is principally due to a serious soil shifting condition in the area, volumetric change of which can exceed 50%. We are presently evaluating what action should be taken to minimize this problem.

A system design engineer from the sewage and water board in Louisiana: "The water board is high on A/C pipe. Our depreciation plans are based on minimum life expectancy of 50 years, but we are programming A/C pipe to last forever. In 1950-53 as the city expanded northward, the corrosiveness of the area caused the iron to disintegrate quickly. A/C pipe's resistance to corrosive soils was the original reason for specifying A/C pipe. The flexibility of the A/C coupling also helps to adjust to the shifting soils of the area."

Following are a series of comments from engineers and managers from the public works department of a booming Texas city: "Based on our charter, the City Council selects the low bid. A/C pipe is the low bidder."

"A/C pipe required more care in installation than cast iron. However, electrolysis causes real problems for cast iron. We are spending \$15-20 million per year on our replacement program of cast iron because of corrosive soils. A/C pipe does not show tuberculation, nor build-up in the inner wall of the pipe and is not affected by the corrosive soils"

The General Manager of a small non-profit community water system in Arizona made the following comment; "Our community uses A/C pipe exclusively

to have a uniform, economic pipe system capable of resisting corrosive soils and resisting build-up in the inner walls. A/C pipe does that for us."

Well, I believe that these comments from the users of A/C pipe speak effectively for its performance.

(audio-visual presentation)

Before accepting any questions on the audio-visual program, I would like to say that the Association proposes to continue building on this program. For example, this afternoon and tomorrow morning, the Technical and Market Development Committees will among other topics discuss this A/C Pipe Performance Program and how to build on it. This is the beginning ... not the end of this program. To do so, we need the cooperation and support of the member companies. We will need a continuing supply of data - price and bid data, competitive bidding, non-competitive bidding, information on the strengths and weaknesses of cast iron and ductile iron pipe and also the same types of information in the A/C pipe market.

The survey of water utility systems should be continued. Not at the hectic pace of this winter, but in a more systematic manner. The body of information we now have is improving, but should be added to, year by year on a systematic basis. Unless information is added to each year, old information becomes useless rather than valid documentation for follow-up marketing research. Your support will be needed.

It is my pleasure to be here and to be associated with you.

Thank you.

STATE OF THE INDUSTRY ADDRESS: Putting the
I in "Issues and Initiatives."

by

Joseph C. Jackson

President

A/C Pipe Producers Association

Good morning. At last year's Annual Meeting and Industry Conference, I was the leadoff speaker. This year, I find myself batting clean-up.

With that opening line, I thought I might transplant our good friend and "jack-of-all-trades", A/C Pipe, from the boxing arena to the baseball diamond ... and again create another sports parable whereby I could assess the state of the industry. This could have lead to some rather interesting parallels, what with descriptive jargon such as hit ... run ... error ... pinch hitter ... strike three ... foul ball ... wild pitch ... stolen base ... you're out ... you're safe.

I'm sure each of you could conjure up many apt analogies to business situations over the past year. The theme could also have been used to single out some of the more renowned players active in the Association game today. Players like "Specs" Gillen in right field, and the rookie, "Cesar" Korobij, in center ... that old standby, "Wee Willie" Perrell, in left ... and AACPP's journeyman shortstop, "Cowboy" Baker ... and that fearless double-play combination of Taylor to Ambler to Boush ... and, of course, our cocky catcher, "Quips" Duffy.

It would have been interesting to speculate who might have been selected as the starting pitcher. Perhaps one of the Canadian hurlers, "Big John" Zacharias ... or "Irish" Adams ... or "Scrappy" Ariss ... or one of the recent acquisitions, "Laddy" Cran or "Dapper" Ray Kinch.

No need to fret. If they got into a jam, I could always bring in our ace from the bullpen, "Sparky" Olson, with his unmatched assortment of roundhouse curves, tantalizing changeups and sinking fast balls. Not to be overlooked would have been the talented assortment of utility and specialist players sitting on the bench -- "Birdy" Cook, "Spats" Fraser,

"Match Point" Herr, "Spare Part" Marcucci, "Snowflake" McGinley, "Sure Hands" Selby, "Too Small" Small, and "Too Tall" Stinson, and last but not least, "Lobby" Werner.

Opportunities would have existed to discuss the game strategy mapped out by my first and third base coaches, "Spook" Horvath and "Babyface" Welch. As manager of the Association team, it would have only seemed appropriate to make some passing comment about the new and old faces occupying the owner's box behind the dugout ... the league commissioner ... "Bowie" Kahn ... and AACPP's major stockholders ... those big investors from the West, R. H. Cuje and J. H. Swensen ... the high rollers from the East, W. A. Krivsky and J. G. Kelso ... and from the South, W. Whitley and from the North and South, M. Messel, and from the North alone, G. P. Loubert.

It might have been fun to second-guess some of the more controversial calls made by today's umpiring team of Pontz, Miller and McCallie. Assessments could have been made of the team trainers, "Docs" Kotin, Mellon and Asselin ... and their efforts to keep the team healthy and on the field.

Last but not least, we could have collectively identified those interesting Associate Members occupying the reserve seats ... and undoubtedly heard from the restless crowd overflowing the regulatory bleachers, as they alternately applauded and criticized the industry's performance on the playing field ... those spectacular *initiatives* and at times, those costly *issues*.

A hypothetical game situation might have been set up where there were two outs, the industry behind by one run, with the bases full ... A/C Pipe and Health on third, Recommended Work Practices on second, Aggressive Waters on first, the Cost of Performance in the batter's box,

and Pipe Design Principles on deck.

The options were intriguing, and perhaps for some of you, nail-biting exercises. Will A/C sustain its rally, and put the game out of reach with a grand slam? Or would a clean single to center be enough? What are the chances of A/C taking a called third strike?

The baseball analogy could have been expanded to encompass most, if not all, of the *issues* and *initiatives* of interest and concern to the industry today. Nonetheless, it might well have been viewed by some as simply a clever way of evading what needs and should be said about the posture of the industry today. More importantly, my message might have been lost between innings, or not heard over the roar of the crowd. Thus, I dropped this approach and considered other alternatives.

My next inclination was to develop the theme of my industry address ... putting the "I" in Issues and Initiatives ... as I initially intended. This would have involved inserting words beginning with the letter "i" to illustrate the importance of AACPP initiatives on those imponderable, yet intrinsic issues, which impact on the industry's immediate future.

Intelligently, yet incisively interpreting the state of the industry is invariably an invitation to make intuitive judgments as to which of the innumerable, often intangible, and at times isolated bits of information are indicative of industry trends.

Infallability is inherently impossible. Even an independent and impartial interpretation would include inaccuracies and incomplete information which could lead to indecision or impulsive inferences based on inconclusive input. Further, without injecting into the interpretation the inducement of increased income, it would have been irresponsible to identify and insist on implementation strategies which require intensive

involvement on the part of an increasing number of individuals.

In addition, any in-depth interpretation which ignored internal interests would have been ill-conceived and instantly rejected. Instead, the importance of the individual's involvement or so-called "i" factor, to industry initiatives should be implicit. It is an industry imperative which is inseparable from successfully implementing initiatives and insuring the future viability and integrity of the industry.

Well, it didn't take long to realize that rhetorically putting the "i" in issues and initiatives by alliteration, like its baseball counterpart, only complicated matters and masked with unnecessary words what should be said simply, succinctly, sincerely. Besides, I was running out of words beginning with the letter "i".

Nonetheless, each exercise proved useful. Both disciplined my thought processes and through introspection, forced me to look beyond simply business considerations to assess the state of the industry. Ironically, the key word in the preceding sentence as far as I'm concerned also begins with the letter "i" ... introspection.

Why is it a key word? I truly believe the state of the industry in the immediate future, as it often has been in the past, will be as much a state of mind as it will be a reflection of problems and, yes, opportunities. As stated in A/C Pipe and Health, the way in which we perceive things varies from individual to individual ... from situation to situation.

What I would like to do now is share with you some of my perceptions about the industry today. I won't dwell on statistics, since all of you have your own and perhaps better means for gauging how well your respective companies are faring in the A/C pipe business. Let me just add that 1978, at least for most U.S. member companies, could be considered a reasonably good year -- nothing to brag about, but certainly nothing to be ashamed of.

Regrettably, from the little I know, the same statement probably would not hold true for some of our member companies in Canada and Mexico. I am not conversant with the situation overseas, thus, I will defer to our Associate Members in attendance for an assessment of those markets.

Nor do I plan to dwell on the economic climates within which you compete for business, since they were addressed in yesterday's session by individuals much more qualified than I am. Nonetheless, I would be remiss in my management obligations to you if I did not add, I believe the U.S. industry is already experiencing a downturn in the business cycle. Since this was written in advance of the meeting, I may simply be opening my mouth to change feet.

What I would like to address are some of the more intangible factors I see developing within the industry which could covertly and overtly impair its ability to survive and grow ... developments which are both good and bad. However, before I do, I would like to digress for a moment, and set the tone of my remarks to follow, by injecting at this time a persistent thought which kept flitting through my mind as I tried to capture my thoughts on paper. And it was this.

Too often we underestimate our impact on one another, and perhaps do not realize the various interpretations placed on what we say. The spoken word is the most powerful tool man has at his disposal. Words can be used to inspire confidence, or conversely, dampen enthusiasm. There are words which hurt, and words which soothe. Words that can spell success or guarantee failure. Words which confuse, words that clarify. Words that are meaningless and words that are meaningful. And often, what is left unspoken is as significant as what is said.

I was once told by an individual skilled in the art of communication that regardless of how well-intended our words might be, it was only

their impact on the listener that counted. This brings me around to the bad news, and an observation I feel reluctant, because of its potential impact on some of you, but nonetheless obliged, because of my own motives, to make about the A/C pipe industry and its ability to get along with itself.

If I am correctly interpreting the many and repeated sidebar comments I hear, I am forced to conclude there is a growing reluctance to listen to one another, and an increasing tendency to question the other fellow's motives, since corporate commitments to A/C pipe are being assessed on the basis of actions, rather than words. Since AACPP not infrequently is caught in the middle, I want to reiterate a basic tenet of Association policy.

AACPP should not act as an arbiter for inter-company disputes, but when permissible, provide a forum for intra-industry dialogue to catalyze resolution of common problems. If the Association is not providing this opportunity, then it's time to reassess its policies ... its directives ... its priorities ... its programs ... and yes, perhaps its personnel.

I am not predisposed to exercises in self-flagellation. Generally, they are self-defeating and nonproductive. My comments are simply meant to clear the air, and hopefully set the stage for a productive two days constructively critiquing the *issues* and *initiatives*. We will all benefit, if we will say what we mean ... and mean what we say. For whether we like it or not, truly we all do need each other, more than ever.

Now I would like to again turn your attention to the "Issues and Initiatives". Although I would be the first to admit the health factor in all likelihood will be with us for some time to come. I am equally convinced that if the initiatives which were developed through the Association, or will be developed through the Association, are aggressively implemented, a major step will have been taken towards resolving those issues of primary concern today.

This belief is based on two fundamental premises, (1) A/C pipe is not a health risk to the public, and (2) the industry has the resiliency and resolve to tough it out.

While it might be bad form to toot one's own horn, how many other industries are you aware of which would have displayed the tenacity which the A/C pipe industry has and remained viable ... profitable ... and essentially intact.

I would like to think your attendance at this meeting is tangible evidence of your corporation's continuing commitment to the long-term growth and prosperity of the A/C pipe industry. And from here on, I am depending on each and every one of you to be the only "I" which counts in "Issues and Initiatives."

I would like to offer for your consideration three specific recommendations. First, collectively and individually, we should renew our efforts to re-install pride and confidence in A/C pipe, with our customers, with our sales force and even our adversaries. As has been stated on many occasions, policies of vacillation and limited involvement are the antithesis of aggressive selling. You can't sell what you don't believe in.

We should turn an attentive ear to constructive criticism, regardless of the source, yet be quick to factually rebut false allegations and spurious arguments. Member companies must accelerate their learning curve on the health issue, and expand internal and external education programs. An informed public is an enlightened public. Ignorance and indifference are poor excuses for the lack of involvement, and potentially the industry's "Achilles' heel."

Second, industry growth cannot be sustained without major technical innovations which address simultaneously perceived health

risks and acknowledged product deficiencies. We should renew our commitment to research and diligently explore the possibility of fundamental material changes which would eliminate the potential for fiber release, thereby providing the industry with a final, technical solution to aggressive water attack on A/C pipe.

Concomitantly, we should thoroughly and seriously investigate changes in pipe design which will improve existing flexural and impact properties to permit the manufacture of thinner-walled pipe which is price competitive with plastic pipe in smaller sizes, and ductile iron pipe in larger sizes. There will be some who will state that is technically infeasible. To those individuals, I can only simply say, nothing ventured, nothing gained.

Finally, the industry should increase its public visibility. The lack of aggressive advertising and promotional campaigns is being viewed as a reflection of the industry's eventual demise ... and in at least one instance, interpreted by a regulator as evidence that A/C pipe has already thrown in the towel. However, illogical these deductions might seem to you and me, they do illuminate the criticality of maintaining a high visibility. We need to tell our story in every nook and cranny of the public and political arena. And, gentlemen, there is a story to tell ... a factual and impressive story ... a story which should be told and retold.

A/C is cost-effective ... it is reliable and durable ... it is efficient ... and the public ought to know. Sure it has some drawbacks, but what product doesn't. When judged in terms of the total cost of performance it's a mighty tough competitor.

If the industry is willing to roll up its sleeves and continues to do its homework, there's no reason why it shouldn't maintain its competitive edge. A competitive edge which can be easily honed with

liberal strokes of industry enthusiasm and consumer awareness. An edge which nonetheless can and will become dull if it's abused, misused or simply not used. An edge whose temper will be measured by the temper of this industry's senior management, and the innovative capabilities of its technical personnel. A temper which I believe can be hardened, not weakened by controversy. A temper which I know can be made stronger during the next two days, simply by putting the "I" in "Issues and Initiatives."

Gentlemen, it's your turn at bat. Let's win one for the old pro, A/C pipe. I think he deserves it, don't you?