SESSION I
World Trends in the Soap and Detergent Industry

Soaps and Detergents: North American Trends

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ABSTRACT

North America, the U.S. and Canada, produces nearly one third of the world supply of soaps, detergents, and cleaners, primarily for household consumption. The U.S. contributes 95% of North American production. Cleaning product demand is steady and expected to remain so, but new demographic trends affecting households and living arrangements will probably stimulate consumer needs for more convenience-oriented products. Environmental considerations and government actions in recent years have caused drastic changes in detergent composition, especially affecting laundry detergents. Government involvement in business decision-making has expanded enormously with no prospects of reduction because legislators perceive government regulation of industry to be necessary for the attainment of broad social goals.

In these days of instant everything, our industry world has grown smaller like the world itself. Developments in one country can produce immediate effects in others. A technical advance here finds application there. Nonetheless, national distinctions are still to be taken into account, just as lifestyles around the world are by no means uniform although some differences in dress and customs are disappearing. The information presented at this conference will help us to understand our industry from a global as well as national viewpoint, and I hope that my remarks will help illuminate the present soap/detergent situation in North America.

North America – the U.S. and Canada – produces and consumes about 31% of world production of soaps, detergents, and other cleaning agents. World production was rated 20.2 million metric tons for the year 1975, according to the most recent annual compilation of worldwide country-by-country statistics (1). The U.S. accounts for 95% of the North American supply, but the U.S. population, now officially estimated at 217 million, is nearly ten times larger than the Canadian population. In fact, U.S. production for 1975 exceeded by about 35,000 metric tons the combined production total reported for the 18 nations of Western Europe plus Canada.

U.S. and Canadian production in 1975, by broad product groups relative to the world, is shown in Table I. The big news in the U.S. has been in the liquid detergent category which has expanded due to substantial growth in the heavy duty laundry liquids over the past few years. Heavy duty liquids are now said to account for almost 20% of laundry detergent volume.

The U.S. figures given are estimated, since official statistics are infrequently released. Up-to-date statistics on Canada are available from monthly and annual bulletins published by the government. Comparable official information for the U.S., however, is issued only at 5-year intervals when the national *Census of Manufactures* is taken. Incidentally, the next *Census of Manufactures* will cover this year, with preliminary results expected by 1979.

About 90% of the U.S. output is for household consumption and reaches the consumer primarily through sales in supermarkets. In 1976, Americans spent $2.4 billion for soaps, detergents, and cleaners and another $579 million for laundry aids. Dollar sales volumes of these products as reported by *Chain Store Age* for the years 1975 and 1976 are presented in Table II. To put the economic significance of cleaning products into another perspective, these product groups taken as a whole generate about 2.5% of total sales of all products sold in supermarkets. Table II also shows that heavy duty powders remain the dominant laundry product, accounting for 75% of the generic group. Pow-

TABLE I

Production of Soaps, Detergents, and Cleaners in 1975[a]
(in 1,000 metric tons)

	Canada	U.S.	North America	World
Soap	41	605	646	5,721
Toilet	28	370	398	1,586
Synthetic detergents	270	4,900	5,170	12,799
Solid	250	2,700	2,950	8,652
Liquid	20	2,200	2,220	3,494
Others (cleaners, etc.)	7	430	430	1,436
Total	318	5,935	6,253	20,231

aSource: Based on data issued by Henkel KGaA Volkswirtschaftliche Abteilung.

TABLE II

Dollar Sales in Supermarkets[a]
(in millions)

	1975	1976
Soaps	$ 401	$ 415
Toilet bars	373	380
Laundry (bars, flakes, powders)	28	35
Detergents	$1,600	$1,706
Laundry	$1,104	$1,176
Powders	863	891
Liquids	190	230
Tablets	6	16
Special purpose	45	39
Dishwashing	$ 496	$ 530
Hand	332	345
Machine	164	185
Cleaners	$ 232	$ 250
General purpose	144	161
Scouring powders	88	88
Laundry aids	$ 529	$ 579
Presoaks	62	78
Bleaches	239	240
Fabric softeners	195	223
Bluing	3	3
Water conditioners	31	35

[a]Source: Based on data reported by *Chain Store Age.*

TABLE III

Home Care Activities Performed[a]
(average 2 wk period)

Activity	Households performing	
	Percent	Frequency
Laundering	100	6.3[b]
Dishwashing	100	22.1
Sweeping/vacuuming	98	9.5
Dusting	92	7.5
Washing	91	12.7
Waxing and polishing	43	3.0
Stain removal	32	4.1
Other cleaning	6	1.4

[a]Source: Market Research Corporation of America (Chicago).
[b]1-week period.

TABLE IV

Product Use in Laundering[a]

Product	Households using (%)
Laundry detergents	99
Light duty liquids	14
Bleach	53
Presoaks/diaper cond.	5
Brighteners/bluing	5
Rinses/fabric softeners	43
Dryer products	21
Water softeners	7
Other products	12

[a]Source: Market Research Corporation of America (Chicago).

ders also contribute 37% to total sales volume, excluding laundry aids.

The outlook for continued industry growth is bright, despite challenges in various areas. Consumer usage is being sustained, new detergent systems are emerging, and the industry is coping with legislative and regulatory actions.

Washing and cleaning are well-established consumer habits, and there appear to be no new developments on the horizon which would render these activities obsolete or objectionable. Current types of home maintenance activities will continue into the future, but their dimensions are subject to shifts in consumer priorities.

A mini-overview of the cleaning and laundering activities now practiced in American households is shown in Table III. This information resulted from a census of 2,000 households conducted by a private research organization during the 12 consecutive months ending June 1976. Each household participated over a 2-week period and kept a diary of all washing and cleaning activities, recording such facts as time spent in performance, equipment and products used, items cleaned or washed, and their characteristics. Details on the age, construction, and features of the dwelling were also obtained, along with water samples which were tested for hardness levels.

Laundering and dishwashing are the most commonly practiced in terms of both incidence and frequency. Table IV shows the use of detergents and laundry aids. The low use incidence for some of the latter, although indirectly complimentary to detergents, suggests good potentials for expansion. The laundering methods used in conjunction with these products break down into 13% by hand, 83% by in-home machines, and 4% by machines in laundromats. It comes as no surprise that 83% of the loads were processed by in-house machines because, as of year end 1976, 72.5% of the electrically wired homes were equipped with clothes washers (2). The comparable figure for clothes dryers (electric and gas) is 58.6%. Incidentally, 41% of these households pretreated laundry. Pretreated articles average 4.4 items per week per household. Soil/spot removers were used to treat almost one half the items, with laundry detergents and bleaches each used to treat slightly less than one fifth.

Similar product use information for dishwashing is presented in Table V. Presently, about two out of five households are equipped with dishwashers. Interestingly, dishwasher owners wash their dishes by hand 58% of the time. Automatic dishwasher detergents thus face sizeable increases in consumption as utilization of machines in place is increased and, of course, as home ownership of the machines expands.

The information just reviewed describes habits and practices that are not likely to change rapidly, but consumer lifestyles must be watched closely. More and more of our industry's best customers, the nation's housewives, are entering the labor force. Presently, almost half of all married women work, and most are mothers. With increased demands on her time, the housewife will clearly be seeking

Product Use in Dishwashing[a]

Product	Dishwashing occasions (%)
Laundry detergents	5
Light duty liquids	79
Dishwasher detergents	11
Scouring pads	19
Other products	6
Multiple product use	20
No product use	3

aSource: Market Research Corporation of America (Chicago).

nore convenience-type products and services. As an exam-
ıle, the effect of the housewife's movement out of the
ome is already being felt keenly by the supermarket indus-
ry, which finds itself in direct competition with the fast
ood restaurants for consumers' food budgets (3).

Another interesting phenomenon is the rising promi-
ence of one-person and two-person households and house-
olds comprised of unrelated individuals. Currently 51% of
ll households are of the one- or two-person variety, com-
ared with 41% in 1960. The drop is attributed to lower
ertility rates, a tendency for young people to postpone
ıarriage, the ability and desire of young single persons
nd the elderly to live alone, and the ease and frequency of
ivorce. Married couples maintained only 65% of U.S.
ouseholds in 1976, down from 71% in 1970. This infor-
ıation suggests that a new group of consumers with weak
nks to traditional concepts of home maintenance may be
ıerging as a force in the marketplace. However, these and
ther demographic trends will generate opportunities for
ıe creation of new and better products to serve the con-
ımer.

But the ability to serve, and to serve well, grows more
ɔmplex due to escalating governmental control of con-
ımer products. The recent history of our industry (and
:hers) has been largely determined by government actions
ıd attitudes which bore little relevance to the benefits or
erits of the products per se. Environmental concerns, as
ɔposed to considerations of consumer needs or perfor-
ance superiorities, have caused drastic changes in product
ɔmposition over the past 15-20 years.

The first product components to attract attention were
ıe surfactants, because of foaming problems on streams
ıd in sewage treatment plants that were associated with
ıeir presence. The switch to biodegradable surfactants in
ıe U.S. was voluntary and was achieved by the end of
)65. The changeover involved the substitution of soft
ıear alkylbenzene sulfonate (LAS) for the hard, branched-
ıain homologue (ABS). LAS is still a major detergent in-
edient, with 1975 consumption estimated at 300,000
etric tons (4). In recent years, however, LAS has barely
aintained its market share due to expansion in the
$_{12}$-C_{15} alcohol-based surfactants. Consumption of the
tter was estimated at 290,000 metric tons in 1975 (4).

Legislative restrictions on detergent phosphates aided
e market growth of the C_{12}-C_{15} range materials because
the increase in formulation surfactant levels needed to
aintain product performance under conditions of zero or
duced phosphates. The latter situations also emphasized
e lower sensitivity to water hardness of these surfactants
ɔmpared to their major competitors. Other surfactants of
ɡnificance are C_{16}-C_{18} alcohol sulfates, about 45,000
etric tons of which are used in heavy duty laundry deter-
nt powders, and alpha olefin sulfonates that are finding
ɔplication in specialized products. Consumption of alkyl-
ıenol ethoxylates runs about 90,000 metric tons, mainly
industrial surfactant uses. The application of these mate-
ıls is somewhat limited because they biodegrade less

Detergents again became the focus of environmental attention in the late 1960s, this time concerning the role of phosphates in eutrophication. Legislation limiting detergent phosphates – and some with later total ban provisions – began to be enacted by late 1970, and primarily affected laundry detergents. The search for a suitable phosphate replacement, which had been initiated before legislative pressures were exerted, intensified. Now, new builder materials are beginning to appear.

Sodium tripolyphosphate is still the leading detergent builder. However, the phosphate content of laundry detergents has been progressively reduced since 1970 even in non-ban areas. The phosphate content now stands at an average 6%, as elemental phosphorus, down from a range of 9-12% in 1970. Overall, detergent use of phosphates is estimated at 450,000 metric tons as sodium tripolyphosphate.

The predominant phosphate substitutes used in the U.S. currently are sodium carbonate, sodium citrate, sodium silicate, and various surfactant blends. NTA (nitrilotriacetic acid) is used in Canada, where a virtual detergent phosphate ban has been in force since January 1, 1973. In the U.S., the industry voluntarily discontinued using NTA late in 1970 pending further study of its health effects.

The newer candidates announced as detergent phosphate replacements include aluminosilicate zeolites, sodium carboxymethyloxysuccinate (CMOS), and Builder M, which is reported to contain trisodium 2-oxa 1,1,3-propane tricarboxylate and other functional ingredients (5). None of these materials is a total replacement for phosphates on a 1:1 basis. Various zeolite-containing formulations, among them one containing 3% P, are now in the consumer testing stage. Builder M and CMOS are not yet in commercial production, but there is some present zeolite capacity which would have to be expanded should detergent applications gain broad acceptance.

These alternatives are several years away from full commercial availability. Other potential phosphate substitutes will undoubtedly appear in the fairly near future, because the extensive search for suitable replacement materials is maturing and detergent phosphates are still subject to environmental attention in areas where no bans presently exist.

Areas where detergent phosphates are banned by law or state regulation include the states of Indiana, Michigan (October 1, 1977), New York, and Vermont (early 1978), Dade County (Florida), the cities of Chicago (Illinois) and Akron (Ohio), a few suburban communities surrounding Chicago, and a handful of other communities in resort localities. The restrictions or bans on detergent phosphates involve many individual pieces of local and state legislation, which became effective on different dates and contained different provisions. These variations have had a serious impact on the uniformity and economy of the manufacturing and distribution practices in the jurisdictions affected, and have sometimes spilled over into neighboring areas. The latter effect was due to the fact that the marketing or warehousing regions of some manufacturers and supermarket chains included more than one legal jurisdiction.

The restrictions, as mentioned earlier, primarily affect laundry detergents. Their phosphate content was usually eliminated in a two-step process. First, a reduction was mandated to 8.7% P, the minimum practical performance level, followed by a total ban effective 6-12 months later. Some communities enacted only 8.7% P limits. Household machine dishwashing compounds and industrial and institutional detergents were largely exempted from total ban provisions, but limited, in some cases, to 11% P or 8.7% P levels, upon evidence that they could not be effectively formulated without phosphate. In Suffolk County, New York, detergent products containing specified synthetic surfactants have been prohibited since March 1971 because of seepage problems from cesspools into wells. For all prac-

tical purposes, only soap products for laundering and hand dishwashing can be made available to consumers in Suffolk County.

The majority of anti-detergent phosphate legislation was enacted between October 1970 and June 1971. Very early in this period manufacturers began labeling household laundry and dishwasher detergents in terms of the percentage of phosphorus in the formulation and the gram equivalent per recommended use level. This action was taken to correct erroneous information which appeared in product lists distributed to consumers by various organizations and publications. The anti-detergent phosphate situation then became relatively quiet for the next several years as public interest shifted to other problems, such as inflation, energy, Watergate, etc. During this period, detergent phosphate bans were, in fact, revoked or amended by the State of Connecticut and a number of local communities. By 1975, however, renewed interest in banning detergent phosphates was mounting, and subsequently resulted in enactment of a ban in Vermont and promulgation of phosphate ban regulations by water pollution control authorities in the states of Michigan and Minnesota. The bans in these last two states have been challenged in the courts. We are awaiting a ruling on their legality.

There is a continuing concern on the part of U.S. and Canadian authorities regarding the eutrophication problem of the Great Lakes. The International Joint Commission, a Canadian-U.S. body created to deal with problems along the common frontier, is formally recommending enactment of detergent phosphate bans in the Great Lakes states that are currently free of such restrictions. The U.S. Environmental Protection Agency, especially EPA Region V that encompasses the Great Lakes Basin, supports a detergent phosphate ban in this area as an immediate means of reducing the ecological stress on the lakes. A federal ban on detergent phosphates in the Great Lakes states, that was unexpectedly introduced as a floor amendment to the Clean Water Act of 1977, was passed by the Senate in early August and now awaits action in the House of Representatives.

The proposed ban would do little to improve the water quality of the Great Lakes, because laundry detergents now supply only 9% of their total phosphorus load. Nor have the bans in New York and Indiana produced demonstrable improvements in water quality during the 4 years they have been in effect. The bans have had an economic impact on consumers, however, due to their efforts to compensate for lowered performance by stepping up use of detergents and laundry aids and to the detrimental effect of carbonate-built products on launderable items and washing machines. Continuous use of those detergents in hard water leads to buildup of limestone deposits on fabrics and washing machine parts which shortens the serviceable life of both.

Unfortunately, the water hardness of most phosphate ban areas generally runs from hard to very hard, i.e., from 121 to over 180 parts per million as calcium carbonate. In fact, though there is wide variability of water supplies geographically, about 85% of U.S. households are in areas of sufficient water hardness to interfere with the home laundry process (6). The cost increases to consumers deriving from the bans are estimated to range from $5-$236 per household per year (7). The higher end of the range reflects repair or replacement of washing machines and launderable items as well as increased use of detergents and laundry aids.

The real lesson of the detergent phosphate issue is one that portends the future. Legislators at all levels of government more and more are using regulation of industry to achieve various social goals in terms of human health, the environment, energy, and consumer benefits. Detergent phosphate bans are by no means the whole story.

In another area, that of consumer benefits, the U.S. Federal Trade Commission, which is the regulatory agency that oversees the administration of federal antitrust laws and the conduct of trade, has had the detergent industry under close review. Several years ago, the FTC proposed a regulation requiring full ingredient labeling of laundry detergents, on the premise that such information readily available on the package would assist consumers to make intelligent product selections in the marketplace. The proposal was recently abandoned because the FTC determined that the rule would have no beneficial influence on consumer buying choices. Presently, the FTC is investigating the competitiveness of the heavy duty laundry detergent industry. The commission is also seeking to develop a product performance standard in order to help consumers make rational buying decisions when selecting laundry detergents. As you know so well, the development of performance standards is complicated by the many variables involved. The developmental work at the FTC is proceeding slowly, and no official proposals dealing with performance standards have yet materialized.

Since the 1960s, federal regulatory agencies have acquired enormous control over U.S. industry. Besides the Federal Trade Commission, the regulatory agencies currently of most significance to our industry are the Consumer Product Safety Commission (CPSC), and the Environmental Protection Agency (EPA). The CPSC has authority over 10,000 consumer products in terms of safety. It can ban products as hazardous and mandate consumer product safety standards. The EPA is empowered, among other things, to set mandatory air emission standards and effluent water guidelines for manufacturing facilities as part of the general environmental cleanup program. Its powers were greatly enlarged through the Toxic Substances Control Act (TOSCA) passed earlier this year. The act has given the EPA complete control over the manufacturing and safety testing of all chemicals. The administration of this act poses formidable problems. Right now, the EPA is preparing extensive reporting and safety testing requirements for chemicals. The full impact of TOSCA will not be known until the administrative mechanisms are fully developed. As you have gathered from this brief review, the role of government has escalated to the degree that it has virtually become the senior partner of the U.S. business, a position it will continue to occupy.

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