Harvard Business School

9-587-055
Rev. May 25, 1993

Rohm and Haas (A)
New Product Marketing Strategy

On May 15, 1984, Joan Macey, Rohm and Haas market manager for Metalworking Fluid Biocides, was reviewing distributor purchases of Kathon MWX, a new biocide that killed microorganisms in metalworking fluids. She found that total sales to distributors for the first five months were 74 boxes against a first-year target of 1,350 boxes. "I have a super product but I can't sell it," she said. "I am in the process of reviewing our approach of taking this product to market, but at this point I am not convinced we have a better alternative."

Macey was also responsible for the marketing of Kathon 886 MW, a liquid biocide used in large metalworking fluid tanks (above 1,000-gallon capacity). Kathon 886 MW was a powerful biocide, and very small quantities were sufficient to treat large tanks. Because of its low-use level, Kathon 886 MW was not suitable for smaller-capacity tanks, and Kathon MWX was developed specifically for use in tanks with less than 1,000-gallon capacity.

Kathon 886 MW had a sales volume of $5.4 million in 1983; sales for the first five months of 1984 were at the budgeted level of $2.1 million. Kathon MWX had been launched in December 1983, with a targeted sales volume of $0.2 million in 1984; sales in the first five months were about $12,000. Macey estimated the market potential for Kathon 886 MW to be $18 million and Kathon MWX to be $20 million. Explaining the poor sales of Kathon MWX, she said:

> The total usage of Kathon MWX and its substitutes is nowhere near the $20 million potential for this market. Many small users are either unaware or don't see the need for biocides in their metalworking fluid treatment. We do poorly because we do not have enough competition to build primary demand.

Company Background

In 1906, Otto Rohm and Otto Haas founded the company in Germany to sell chemicals to that country's leather tanning industry. The U.S. branch opened in Philadelphia in 1909. At the end of World War I, Otto Haas incorporated the American branch as an independent company. Over the

Professor V. Kasturi Rangan and Susan Lasley, MBA '85, prepared this case as the basis for class discussion rather than to illustrate either effective or ineffective handling of an administrative situation. All quantitative data not publicly available have been disguised.

years it became a leader in chemical technology, especially in acrylic emulsion polymers.[1] In 1983, the American company reported worldwide sales of $2 billion derived from four business segments:

1. Polymers, resins, and monomers—for applications in paints, industrial finishes, decorative coatings, and construction products

2. Plastics—for applications in signs, skylights, containers, and automotive products

3. Agricultural chemicals—herbicides and fungicides for crop diseases

4. Industrial chemicals—for lubricants and fuels, water treatment, and the formulation of a wide variety of industrial and consumer products

The company's product lines consisted of over 500 different products. **Exhibit 1** gives the trend of sales and profits by business segments.

The Industrial Chemicals business segment consisted of three product groups: Fluid Process Chemicals, Petroleum Chemicals, and Specialty Chemicals. The Kathon microbiocide products with 1983 sales of $25 million were part of the Specialty Chemicals Group. Surface active chemicals (called surfactants) and water-soluble polymers were the other products marketed by the Specialty Chemicals Group (see **Exhibit 2** for an organization chart). Joan Macey was market manager for microbiocide applications in the metalworking fluid and latex/adhesives markets. Latex/adhesives biocides (1983 sales of $2 million) were sold directly by the Specialty Chemicals sales force to about 50 compounders for use in emulsions, paints, sealants, and adhesives. The metalworking fluid biocides—Kathon 886 MW and Kathon MWX—were sold through a network of formulator/distributors. All of them manufactured and sold metalworking fluids as well as any auxiliary products such as biocides and corrosion inhibitors. As market manager, Macey was responsible for formulating the marketing strategies for the three products under her charge, all of which were sold by the Specialty Chemicals sales force.

Fourteen of the 40 salespeople employed by the Industrial Chemicals business unit worked for the Specialty Chemicals Group and were responsible for selling all the products of the group (surfactants, biocides, and polymers) to various markets. Salespeople were assigned to exclusive territories and were supervised by three district managers who reported to a national field sales manager based at the Philadelphia headquarters.

All members of the sales force had college degrees in chemistry, chemical engineering, or related fields. The salesperson's role was to offer help and advice to the user in formulation or process design, for example, recommending appropriate chemical levels for cooling tower treatment or detergent formulations. Starting salaries for trainees ranged from $20,000 to $27,000 annually, and the experienced salesperson could earn $50,000 to $70,000. Salespeople were evaluated on several objectives, including new account activity, market penetration, and quantity sold in pounds. Six of the fourteen salespeople had most of the biocide customers in their respective territories. On average, they spent about 20% to 30% of their time on all biocide customers; approximately one-third of this time was spent on metalworking fluid formulators (the primary customers for Kathon 886 MW and Kathon MWX). The rest of the time was spent visiting users. Many of these calls were made jointly with the formulators' salespeople.

---

[1]The technology involves dispersing, or emulsifying, certain monomers in a fluid such as water. Then the monomers are "polymerized"—linked together through a chemical reaction. The resulting emulsion polymer retains the viscosity of water. When exposed to air, the water evaporates and a continuous, tough film remains.

Metalworking Fluid Biocides

Metalworking fluid, as the name implies, is used in operations such as turning, milling, grinding, honing, and drilling. The fluid is directed onto the surface of the metal being machined to lubricate and cool the work piece and the machine tool and to remove chips and debris from the work area.

In 1983 about 60 million gallons of metalworking fluid concentrate were produced in the United States. Nearly all of it had to be diluted with water by the user. Water was typically 90% to 95% of the mixture after dilution. The diluted fluid was then placed in a reservoir and pumped to a nozzle that directed the fluid to the machined piece (see **Exhibit 3**). A tray built into the workstation caught chips, and the used fluid was filtered and returned to the reservoir for reuse.

Microorganisms such as bacteria, fungi, and yeast flourish in the warm aqueous environment of metal machining, and their growth increases with poor shop maintenance. They break down the metalworking fluids, and as the microorganisms develop, they multiply in long chains to clog filters, flow lines, and drains. Their foul-smelling, metabolic by-products stain and corrode work pieces and pollute the work environment.

Biocides are chemicals that kill the microorganisms in water-based metalworking fluids without affecting fluid performance. They have many applications in manufacturing products such as cosmetics, paper detergents, and latex paints. They are used, as well, in water treatment and oil-field drilling.

Chemical companies formulate metalworking-fluid concentrates by mixing emulsified oils and special additives. Formulators often add biocides to the metalworking fluid concentrate to provide some initial protection against contamination. The concentrate is then sent to users who dilute it for their machining operations. Metalworking fluids are depleted by water evaporation and fluid loss and must be replenished each day. As the fluid ages, the concentrate biocide no longer adequately protects it, and a maintenance biocide must be added to extend fluid life. A metalworking system kept free of bacteria, yeast, or fungi uses fluid for a much longer period of time—one or two weeks longer than the three to four weeks for a less well-maintained system. Regular treatment with maintenance biocides and make-up metalworking fluid (every one or two weeks) extends fluid life almost indefinitely and does not require a complete flushing of the fluid tank.

The *concentrate biocide* market was estimated to be $30 million in 1983. Industry sources predicted a downward sales trend, however, because of the growing use of maintenance biocides. The *maintenance biocide* market was estimated to be about $38 million in 1983, but if industry predictions were right, it would replace nearly all of the concentrate biocide market in 10 years.

Kathon Metalworking Fluid Biocides

Kathon 886 MW, a liquid, was the primary maintenance biocide on the market. Too reactive to be used in the metalworking fluid concentrate, it extended the life of diluted fluids in central system reservoirs. Kathon 886 MW was a broad-spectrum biocide generally 10 times more effective than competitive biocides. One gallon of Kathon 886 MW protected 8,000 to 10,000 gallons of metalworking fluid in a central reservoir initially for three weeks. About 10-15 gallons of a competitive product would be required to do the same job. In 1983, Kathon 886 MW had a 30% share of the $18 million maintenance biocide market for large systems. It was distributed by 12 major metalworking fluid formulators, who sold it as part of a fluid maintenance package to their customers. From a practical standpoint, because of its low use level and toxic properties, it could not be used in metalworking fluid reservoirs smaller than 1,000 gallons without creating misuse problems and safety risks.

Customers who were satisfied with the performance of Kathon 886 MW had asked for a convenient, safe-to-use version for their smaller (50- to 100-gallon) reservoirs. A market survey revealed that this was the most common revervoir size for small machines. Rohm and Haas technicians responded with an intense product development effort that led to the development of Kathon MWX.

After attempts to formulate a water-soluble solid product had failed, a unique packaging design to deliver liquid biocide was developed (**Exhibit 4**). It was a 5.5 x 7.5-inch water-permeable plastic packet containing two ounces of diatomaceous earth[2] soaked with Kathon 886 MW. The packet was designed to hang into the metalworking fluid reservoir by a strap suspended on a plastic hook and could treat 25-75 gallons of metalworking fluid for 2-4 weeks. The customer simply placed the packet in the metalworking fluid; water then flowed through the packet and gradually transferred the biocide from the diatomaceous earth to the fluid. The used packet could be removed from the reservoir for disposal at the first sign of failure (odor) or in one month. No maintenance was required, and the packet was safe to handle and dispense. In expanding the fluid maintenance market to include small machine applications, it was estimated that the potential existed for $20 million in added sales volume.

Although Kathon 886 MW and MWX were maintenance biocides, they could be used in only 70% of the metalworking fluids. Incompatibility with the concentrate biocide in the original formulation rendered them ineffective with the other 30%. By comparison, however, competitive maintenance biocides were compatible in only about 45% of commercial metalworking fluids.

Customers

In 1983, there were about 325 potential customers for Kathon 886 MW or equivalent products, and an estimated 150,000 potential customers for Kathon MWX. **Table A** breaks down the metalworking industry by machine size. Biocide users worked with either *nonferrous metals* such as aluminum, copper, tungsten, and titanium or *ferrous metals* such as iron and steel.

Nonferrous metals In the domestic market, nonferrous metals were used primarily to make aluminum sheet, foil, and cans in large-scale, fully automated, high-speed manufacturing facilities. Central systems used metalworking fluid in reservoirs as large as 150,000 gallons. Nonferrous operations required the metalworking fluid to be kept completely free of bacteria because of the sensitivity of the metal to staining, and microbiologists and chemists were often employed to develop biocide treatments and monitor systems closely. Kathon 886 MW was the favored biocide of many of these companies and held about 70%-80% of a $3 million-$5 million market.

Ferrous metals The ferrous metal industries ranged broadly from the large-scale automated manufacture of products such as automotive and farm equipment to the smaller-scale production of pumps, instruments, aircraft parts, and nuts and bolts. Customers with large scale manufacturing facilities had central systems similar to those in the nonferrous industries, but bacteria levels in the metalworking fluid were not as critical to ferrous metals as they were to nonferrous metals.[3] Though Kathon 886 MW was adopted by many for its cost effectiveness, its overall share of the $12 million-$16 million ferrous market (only central systems) was only 15%-20%.

---

[2]An inert solid that when mixed with Kathon had the consistency of moist sand.

[3]The ferrous industry generally accepted up to 50,000 cfu/ml of bacteria (50,000 colony-forming units of bacteria per milliliter of metalworking fluid).

Table A Metalworking Industry Fluid Systems

Metalworking Fluid System	Reservoir Capacity (gallons)	Number of Metalworking Machines	Number of Plants
Central system	50,000 to 250,000	170	25
Central system	8,000 to 30,000	1,530	300
Individual system	50 to 1,000	1,701,000	150,000

Competition

Table B lists the major competitors in the biocide market. In 1983 Rohm and Haas, Lehn and Fink, Dow Chemical, and Angus Chemical each had approximately a 15%-20% share of the maintenance biocide market.

It was assumed that Lehn and Fink and Angus Chemical each employed three salespersons for metalworking biocides. Lehn and Fink sold directly to distributors and end-users, and distributors were supplied at 10% off list price. Angus Chemical sold to distributors and end-users at the same price.

Olin Corporation's Triadine-10, introduced in 1983, was well-received by the market. Two other major chemical companies were planning entries into the maintenance biocide market: Union Carbide with Gluteraldehyde and ICI with Proxel, both for central systems. Rohm and Haas chemists conducted comparative tests (see **Exhibit 5**) to demonstrate that Kathon 886 MW was still the most cost-effective biocide for central systems.

The most widely known product for individual systems was Tris Nitro "Sump Saver" tablets, an Angus product. One two-ounce tablet treated 25 gallons of metalworking fluid. Macey estimated that distributors paid $4.00/pound (eight tablets) and sold them to customers for $7.75/pound. Unlike Kathon MWX, these tablets dissolved in the metalworking fluid. They were generally considered less effective against bacteria and ineffective against fungi, and they worked for only about three days.

Another product, Dowicil 75, came in water-soluble packages that were dropped into the reservoir. Each 2.5-pound package treated 500 gallons of fluid. Macey estimated the cost to distributors at $2.34/pound and a resale price of $10/pound. While Dowicil 75 performed well against both bacteria and fungi, it had a heavy ammonia odor, released formaldehyde, and could not be safely used in reservoirs with capacities less than 500 gallons.

Some metalworking operators in small shops, in a makeshift effort to control the odor released by bacteria, poured household bleaches, disinfectants, deodorants, and similar materials into their smaller reservoirs. The odors of these materials usually combined with the bacterial odor to make the working environment even worse for the workers. These substitute materials also interfered with the cooling and lubricating performance of the metalworking fluid.

Table B Competitors' Products

Company	Concentrate Biocide	Maintenance Biocide: Central Systems	Maintenance Biocide: Stand-Alone Systems
1. Lehn and Fink	Grotan	Grotan	-
2. Dow Chemical	-	Dowicil 75 DBNPA	Dowicil 75
3. Angus Chemical	Bioban P-1487	Tris Nitro	Tris Nitro
4. Olin Corporation	Triadine-10	Triadine-10	
-			
5. Millmaster Onyx	-	Onyxide 200	-
6. RT Vanderbilt	-	Vancide TH	-
7. Merck	-	Tektamer 38 A.D.	-

Distribution Channels

The first level of distributors in this industry were the metalworking fluid formulators. They purchased biocides, both concentrate and maintenance, directly from the manufacturers. The concentrate biocide was incorporated into the metalworking fluid at the time of its formulation. The formulators then sold the metalworking fluid directly to large companies and to other dealers who resold it to smaller accounts. Metalworking fluid generally accounted for more than 90% of a formulator's business. As a service to customers with large central reservoir systems, distributors provided a maintenance package that usually included delivery, fluid preparation, weekly monitoring for microorganisms, and maintenance biocide treatments. Other special-purpose chemicals such as pH adjusters and corrosion inhibitors were provided as needed. Many of these products were sold under the formulators' private brand names. Most formulators engaged in R&D, acceptance testing of manufacturers' additives, and systems monitoring.

In 1983 the total sales of 10 large national formulators were roughly $200 million. Another 20-30 formulators had a combined sales volume of some $100 million. Several hundred small formulators had sales of $0.5 to $1 million each. Because of the number and fragmentation of the ferrous metalworking industries, large formulators distributed their products through a secondary distribution network, consisting primarily of industrial supply houses and machine tool shops.

Industrial supply houses ranged from small, family-managed companies in rural areas to large, professionally managed companies in urban areas. Some specialized in serving particular industry sectors. They were "supermarkets" for their customers. A supply house servicing a ferrous metalworking industry, for example, might carry several brands of biocides, safety accessories, uniforms, small general-purpose tools, shop cleaning and maintenance supplies, worktables, hand trucks, concrete blocks, spill absorbents, and hand soaps.

The 1982 Census of Wholesale Trade listed 14,327 industrial supply houses in the United States. A major metropolitan area might have over 100 supply houses serving a variety of industries. Industrial supply house sales in 1982 amounted to approximately $40 billion. Inside salespeople took telephone orders from regular customers and over-the-counter orders from walk-in customers. Outside salespeople generated new accounts and called on regular customers.

Machine tool shops specialized in distributing and servicing machine tools and items used with them like spare parts, tool bits, metalworking fluids, and biocides. Some also served as sources

of metals. There were 3,654 such companies in the United States, and in 1982 their sales were $8.7 billion.

Typically, large industrial companies (e.g., General Motors, Caterpillar Tractor) purchased biocides directly from manufacturers or from their distributors (formulators). They used the secondary network of industrial supply houses and machine tool shops for miscellaneous items (such as safety equipment or paper towels) that were not critical to their line of business. Small companies, however, often relied exclusively on industrial supply houses and machine tool shops for all their needs.

Marketing Strategy for Kathon MWX

Ten of Rohm and Haas's 12 distributors (formulators of metalworking fluid) agreed to distribute Kathon MWX in addition to Kathon 886 MW. The company offered private branding on Kathon 886 MW, but not on Kathon MWX. Though many formulators asked for private branding, only one distributor declined to carry Kathon MWX when turned down on a request for its own-brand product. Explaining the rationale for this policy, a company manager said:

> Kathon MWX is the industrial equivalent of a consumer packaged good; it is a "baggie" product packaged at the factory. We need some uniformity in package design. Moreover, we want the end-user to know it's a Rohm and Haas product. Our end-users hardly see the Kathon 886 MW drum because our formulators include the product as a part of their maintenance service. But Kathon MWX is different; we expect the end-users to do the maintenance themselves.

Kathon MWX was packed in boxes containing 144 packets, each packet weighing two ounces. Quantity prices to distributors per box of 144 packets were as follows:

1-2 boxes	$180.00
3-4 boxes	165.00
5+ boxes	145.00

Joan Macey estimated the manufacturing cost per packet to be about 50 cents. The company did not specify a price to end-users, but most formulators charged end-users and other dealers $2/packet. Some formulators had a strong secondary distribution network consisting of 200-300 industrial supply houses, and in such instances, the secondary level of distribution was known to add a 10% margin. One of the company's distributors with a sales force of 700 commissioned reps claimed that he could sell each packet for $6 to the end-users.

The product launch (December 1983) was accompanied by a press release in 40 metalworking industry journals announcing the availability of Kathon MWX. The announcement included information about characteristics of Kathon MWX and its benefits. Full-page advertisements costing $3,800 each were placed in five issues of *American Machinist* between February and June 1984. Interested readers could get further information and a two-packet sample by filling out a reader service coupon. Over 200 such inquiries were received from the February, March, and April advertisements. All inquiries were forwarded to distributors. Rohm and Haas responded directly with a copy of the very colorful ad, a material safety data sheet, a set of technical notes, and a "how-to-use" booklet (see **Exhibit 4**). Distributors were expected to follow up on the leads and generate orders.

In spite of all these efforts, the sales in the first five months of the launch period barely touched $12,000.

Joan Macey's Dilemma

Disappointed with Kathon MWX's sales performance, Macey began a review of her marketing plan to take any necessary corrective steps. She also sought opinions from two of her colleagues in the Specialty Chemicals division who had successfully launched and established new products. Her first colleague advised:

> You are too hard on yourself, Joan. New products don't succeed overnight. It takes years for the product to get market acceptance and longer still to get dealer support. If you feel comfortable about your original marketing plan, it's worthwhile giving it a chance. We are in the business of specialty chemicals, we offer solutions to customers' problems. We are not in the fashion business!

Her second colleague felt differently; he agreed that Kathon MWX's initial marketing approach was probably not best suited for the product. He encouraged Macey to review the marketing plan, saying, "The only good news on Kathon MWX is that you know there is a problem; therefore you can fix it."

Regardless of what she might ultimately do about her strategy for marketing the product, Macey thought it would be a good idea to contact the 200 prospects who had responded to the reader service coupons. Macey employed a summer trainee who was working toward an MBA to conduct a telephone survey. Explaining her rationale for the survey, she said:

> I wish I could thoroughly research the market, but that's not possible. Frankly, what else can I do with the limited budget I have for support activities? Kathon MWX has to show some initial movement before further resources are justified. It is imperative that I make a quick decision. After all, I have other products to manage and my boss has the entire biocide business to manage. One has to place Kathon MWX in its proper perspective. A quick survey should do that.

The survey revealed several major facts:

1. On average, customers discarded used metalworking fluid after three weeks. Rancidity and dermatitis[4] were the primary reasons for this, and most customers believed that bacteria, not metal particles or harsh chemicals, caused the dermatitis.

2. Although most survey participants had their used fluids hauled away, few knew how much this service cost. Those who did know gave figures of $0.29, $0.55, $1.80, and $2.00 per gallon of used fluid.

3. Only about 20% of the participants remembered receiving the Kathon MWX information packet. When asked about the image of the product conveyed by the promotional literature, many said that the product was worth trying. Despite their inclination to use Kathon MWX, they expressed some apprehension about its safety. An explanation of the proper handling technique usually overcame these fears.

4. Users obtained metalworking fluids from tool shops, oil companies, formulators, and industrial supply shops. The majority sourced from two or more small, local

[4]Dermatitis symptoms are skin eruptions and rashes that last anywhere from a few hours to a few weeks.

tool or supply shops within 30 miles of their businesses, as well as one of the large national formulators. Users occasionally found it necessary to write to a large national distributor for supplies that were not locally available.

5. About 50% of the users used products ranging from household disinfectants to metalworking fluid biocides to kill odor-causing bacteria in their machine sumps. The majority of these products did not seem to work, yet the end-user typically continued to use the product. Only half of the participants who had tried a biocide could remember its name. None had tried Kathon MWX.

From the summer trainee's survey report, Macey extracted the cost information that she thought would be useful in a review of Kathon MWX's marketing strategy (see **Exhibit 6**). She wondered if raising the price would increase end-user perception of the product's value. She wondered what short-term and long-term sales and market share targets were appropriate for Kathon MWX. Concerned about the appropriateness of the current channels of distribution for Kathon MWX, she considered other options. Finally, of course, she wondered if Kathon 886 MW was a help or hindrance in developing a market for Kathon MWX, especially since marketing plans for Kathon 886 MW projected a healthy growth in distribution and market share.

Exhibit 1 Sales and Profits by Business Segments, 1979-1983 (millions of dollars)

	1983	1982	1981	1980	1979
Net Sales					
Polymers, resins, and monomers	$745	$707	$753	$665	$626
Plastics	390	353	376	345	345
Industrial chemicals	336	331	324	303	265
Agricultural chemicals	337	336	308	295	243
Other industries	68	101	124	117	111
Total	**$1,876**	**$1,828**	**$1,885**	**$1,725**	**$1,590**
Net Earnings					
Polymers, resins, and monomers	$79	$47	$45	$53	$50
Plastics	33	9	14	16	27
Industrial chemicals	22	12	23	23	20
Agricultural chemicals	18	24	21	20	16
Other industries	(11)	2	(6)	(9)	(1)
Corporate	(3)	(8)	(4)	(9)	(16)
Total	**$138**	**$86**	**$93**	**$94**	**$96**
RONA[a]					
Polymers, resins, and monomers	19.7%	12.9%	11.5%	12.8%	12.1%
Plastics	13.9	3.7	5.2	7.3	13.2
Industrial chemicals	12.6	7.4	13.1	13.8	12.0
Agricultural chemicals	7.2	9.1	7.2	9.8	9.7
Other industries	(6.3)	1.2	(4.2)	(6.1)	(1.0)
Total	**10.5%**	**7.6%**	**7.9%**	**8.9%**	**9.6%**

Source: Company records

Note: Net earnings are from continuing operations (before extraordinary credit in 1979) and are after the allocation of corporate expenses and income taxes. Income taxes are allocated based on the tax effect of transactions included in pretax income. Corporate consists mainly of after-tax interest income and expense.

[a]Return on net assets (RONA) equals net earnings from continuing operations plus after-tax interest expense, divided by year-end total assets.

Exhibit 2 Organization Chart: Specialty Chemicals Group

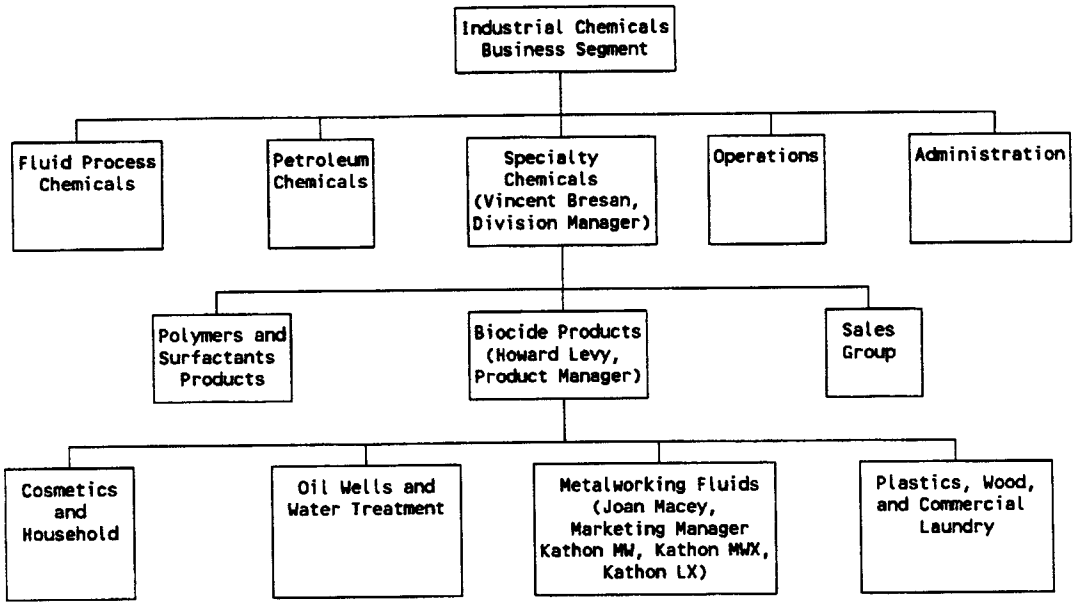


Exhibit 3 Metalworking Fluid

Source: Company material

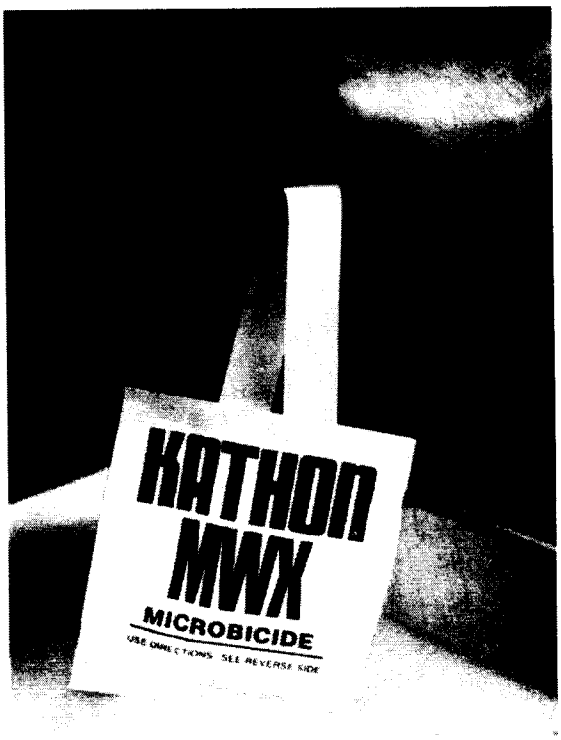
Exhibit 4 Kathon MWX User Information

Kathon® MWX Biocide Packets

for small machine maintenance

Extends fluid life
Extends fluid life
Extends fluid life
Extends fluid life
Extends fluid life
Extends fluid life
Extends fluid life

- Extends fluid life
- Controls bacteria and fung
- Eliminates odor
- Minimizes machine downtime
- Effective over a wide pH range
- Easy to use, safer to handle
- Does not release formaldehyde
- Readily disposable
- EPA registered for metal-working fluids



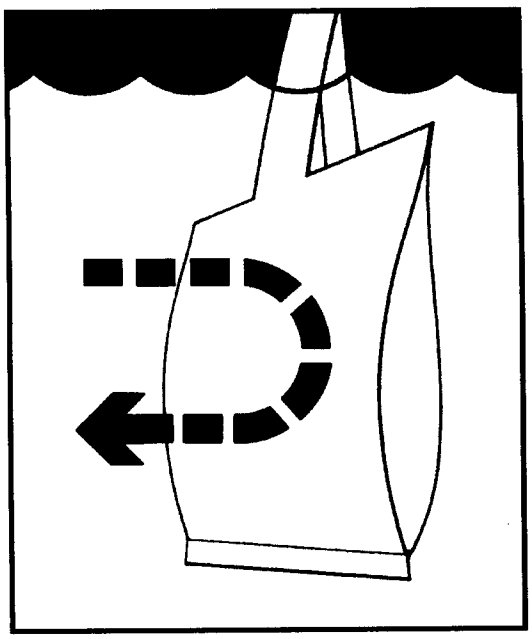


Exhibit 4 (continued)

What is Kathon MWX?

It is a safer-to-handle plastic packet containing a highly water soluble biocide which controls bacteria and fungi, including the odors they produce.

How should you use Kathon MWX?

Simply attach the packet to the hook provided and suspend it from the edge of the sump into a 50 gallon reservoir of dilute soluble, semi-synthetic or synthetic metalworking fluid.

How many Kathon MWX packets should be used?

For noticeably rancid fluids, use 1-2 unopened 2 ounce packets for every 50 gallons of fluid every 1-2 weeks. Follow this with a maintenance dose of one packet for every 50 gallons every 2-4 weeks.

How does Kathon MWX work?

When the packet is submerged in the fluid, the aqueous fluid enters the packet through the small pores and carries the active ingredient back out into the fluid where it destroys bacteria and fungi, including the odors they produce. This flow action will continue to release active ingredient from the packet to the reservoir until it reaches equilibrium (about 3 days). After this, the active ingredient will gradually be depleted as it continues to prevent the development of rancidity.

How will you know that Kathon MWX is doing the job?

Since the active ingredient in Kathon MWX begins to act immediately, any odor produced by the rancid fluid will be significantly reduced within several hours. Slime and other biological debris will pull away from the sides and bottom of the reservoir and disperse in approximately 3 days.

When should the Kathon MWX packet be removed from the reservoir?

The packet should be left in for a minimum of 3 days to reach equilibrium. At this time, the level of active ingredient in the packet is the same as the level in the fluid. This level – 20 ppm – is non-hazardous and similar to the level used in many consumer products. The packet may be left in place for an additional 2 to 4 weeks since it will continue to provide rancidity control until the active ingredient is essentially gone.

How should you dispose of Kathon MWX?

If the packet is removed in fewer than three days, it should be treated with a deactivating solution (see product literature) before disposal. If the packet is removed after three days, it will consist of the plastic packet, diatomaceous earth and a non-hazardous level of active ingredient. It may be disposed of as trash, unless prohibited by state or local authorities.

Source: Company records

Exhibit 5 Kathon 886 MW Cost Effectiveness

Comparative Cost of Treating a 10,000 Gallon System with Biocide (for one cycle)

I. *With Dowicil 75*
10,000 gals.[a] x 8.4 lbs.[b]/gal. x 0.15%[c] x $2.14[d]/lb. = $269.64

II. *With Grotan*
10,000 gals. x 8.4 lbs./gal. x 0.15% x $1.20/lb. = $151.20

III. *With Kathon*
886 MW 10,000 gals. x 8.4 lbs./gal. x 0.01% x $8.50/lb. = $71.40

Source: Company records

[a]This corresponds to approximately 400 gallons of metalworking fluid concentrate.

[b]Weight of metalworking fluid per gallon

[c]Biocide concentration required for treatment

[d]Biocide price to end-user

Exhibit 6 Cost Information Gathered from Survey Data

	Average Cost
Metalworking fluid concentrate	$5.68/gallon[a]
Waste disposal	$1.36/gallon[b]
Kathon MWX	$2/packet

- 1 packet of Kathon MWX treats 25-50 gallons of diluted metalworking fluid.
- A typical small machine shop had 22 machines, each with a reservoir capacity of 50 gallons. It discarded fluid every four weeks. By using Kathon MWX they could keep the fluid 2-5 weeks longer.
- Machine downtime, labor, and water costs were negligible for small machines. Costs of other additives (buffers, corrosion inhibitors) were not considered in a differential analysis.

[a]Per gallon of undiluted fluid. A dilution ratio of 1:24 is assumed.

[b]Per gallon of diluted fluid.