Article

# Dow cleans up pollution at no net cost

By recovering materials and cutting treatment costs, it actually expects a profit

Carl A. Gerstacker, the shrewd, 55-year-old chairman of Dow Chemical Co., quietly finished his soup and sandwich in the company cafeteria in Midland, Mich. Then, pushing back his chair and lighting a cigarette, he pursued a favorite theme: "I cringe every time I hear a company say how much it's costing to clean up pollution. The opposite is true. We expect to make a profit at it."

Though he spoke with matter-of-fact calm, as if pronouncing the world round, Gerstacker was voicing a near-heretical position in American industry. At a time when most executives are indeed complaining about the high cost of pollution control and the inevitable impact on earnings, Gerstacker and his colleagues talk as though the environmental movement were one of the best things ever to hit their $2-billion-a-year company.

In Dow's view, pollution is waste—valuable raw materials and by-products dumped into the air and water, or fed into costly treatment facilities. The company is out to eliminate pollution at the source, by fine-tuning production processes and by recycling waste streams for further processing. By recovering raw material, boosting product yield, and minimizing the investment in non-productive waste treatment, Dow expects to reap a profit from pollution control for the year just ended. "We are recognizing an economic opportunity we overlooked before," says Cleo Otis, director of Dow's two-year-old ecology council.

To achieve such an ambitious and unprecedented goal, Dow must offset abatement costs that already run to millions of dollars annually. In 1971, Dow invested $20-million for capital equipment; at a 9% depreciation rate, the annualized capital cost comes to $1.8-million. Dow is also spending $10.5-million to operate treatment plants already built. Thus, the net annual cost that must be offset is $12.3-million, a tough litmus test of Dow's philosophy. Says Otis: "We have enough examples of the possibilities that we feel confident we can recover at least that much."

Such great expectations have precipitated controversy in the chemical industry and stirred skepticism on Wall Street. "I'm astounded," says A. J. von Frank, director of air and water pollution control at Allied Chemical Corp. "Sure, we can recover some costs, but it's incredible to think of completely offsetting all the costs." Says R.E. Chaddock, coordinator of environmental health at Hercules Inc.: "It's a wonderful goal, but I doubt whether anyone can do it." And from Ernest Ruppe, a member of the environmental committee at E. I. Du Pont de Nemours & Co., comes a disbelieving question: "Net profit from pollution control? No, I don't think we can achieve it."

### Critics say it's all public relations

Privately, some chemical men suggest that Dow, badly burned by the napalm issue three years ago, is merely engaging in clever public relations. Others say that Dow, which markets pollution control hardware and know-how, is trying to boost its environmental sales by bragging about its own cost-clipping achievements. Still others think it is all a matter of bookkeeping. Many companies know to the penny what treatment facilities cost, but rarely tally whatever savings accrue from pollution control. In this view, Dow is not any better at abatement than its competitors, just good at identifying the related savings and balancing them against costs.

But many environmentalists and government officials, generally pleased with Dow's pollution fight so far, are optimistic about its outcome. "Dow has achieved some remarkable things," says John Bohunsky, regional engineer at the Michigan Water Resources Commission. "If they say they can offset their environmental costs, then they probably will." Adds an economist with the Environmental Protection Agency in Washington: "I can believe Dow. Our engineers say it's possible."

In part, the differences stem from the fact that Dow's approach is neither new nor unique, but rather an intensification of traditional chemical industry practices. Companies have long changed their processes to recover waste material, not necessarily in the name of pollution control, but simply as a way to boost yield. Usually, though, they only bothered to recover material if its value exceeded the cost of recovery. Now, faced with the prospect of building costly plants to treat the unrecovered waste, the economics of chemical processing have shifted sharply; recovery and recycling techniques that once seemed costly now are attractive. "We're looking at our processes with a different eye because of pollution," says Chaddock of Hercules.

More and more, that "different eye" is uncovering once-hidden payoffs. Hercules, for example, spent $750,000 for collection and recycling systems at one plant. The investment not only reduced the volume of dissolved solids discharged into the Mississippi River by 90% but also produced an annual saving of $250,000 in material and water costs. With similar savings at other plants, Hercules expects to recover 40% of its annual pollution operating costs, which now total $3-million.

Allied, DuPont, Monsanto, Union Carbide, and others also have achieved savings through recycling. In brief, because its effluents are often valuable, the chemical industry is in a better position to offset environmental costs than, say, the smelting or electric utility industries, where typical pollution is relatively useless particulate matter or oxides of nitrogen and sulfur.

Still, no company appears to have gone as far as Dow in finding ways to clean up and keep costs down simultaneously. "In water treatment, Dow is outstanding in the industry," proclaims Howard Brown, a water quality specialist at the Manufacturing Chemists Assn. "Dow has shown great sensitivity to environmental needs," notes Spenser Havlick, assistant professor of conservation at the University of Michigan, and a frequent critic of industrial polluters. (Havlick has misgivings, however, about air pollution from Dow's Midland power plants. Box, page 34).

### Building an anti-pollution system

Dow's ability to offset pollution costs are impressive. At Midland, the company is erecting 28 cooling towers that will reduce by half the heat load added to the Tittabawassee, a small river that snakes its way past Midland. Though the towers cost $7.2-million, they will more than pay for themselves by enabling Dow to reduce corrosion and to cut its water intake from the river by 100-million gallons daily. Technicians also surveyed all 4,522 air vents at Midland, then equipped each with additional filters, condensers, and charcoal absorption devices that stem pollution and recover chemicals. From calcium chloride production alone, Dow is now saving 250 tons per day of brine and calcium chloride that were once





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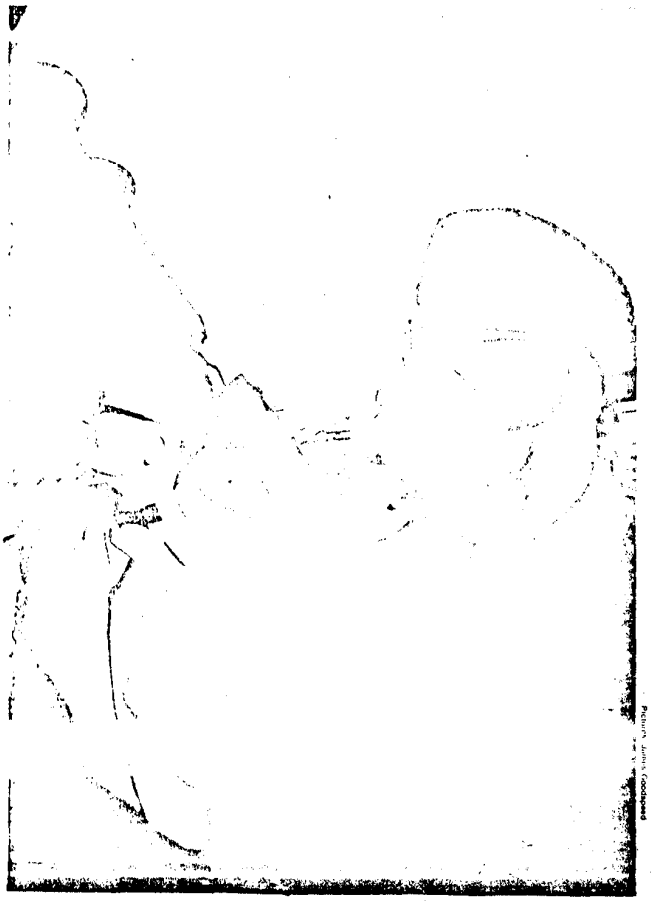
Bosscher (left) and Otis look at aerial photo of Midland complex, where a zero discharge chlor-alkali plant is being built on the Tittabawassee River.

Otis (left), Gerstacker (right) and waste manager Edward Shannon are dwarfed by one of 28 cost-cutting cooling towers Dow is building for $7.2-million.



heedlessly discharged into both the air and water.

In all, says Midland manager Harold Bosscher, the division has saved chemicals worth over $6-million during the last three years, chiefly organics and brine-based salts like bromine. Additional savings accrue from reduced maintenance, improved product quality, and greater yield. In the process, Midland has cut the amount of waste flowing to its treatment plant by 35% since 1969, a further saving.

At the Texas division in Freeport, Dow equipped one new plant with $900,000 worth of controls that are saving $265,000 a year in chlorides, hydrocarbons, and methane. At an ethylene diamene plant, Dow switched from a manual stream separation technique to an automated control system. This boosted yield 350,000 lb. per month, saving $10,000 a month in material, and cutting pollution by 10 lb. per minute of chemical oxygen demand. At a chlorinated methane plant in Texas, Dow increased the nitrogen flow to the purge system that vents to the atmosphere. The result: the company saved over 170,000 cu. ft. of methane in one year and boosted product yield 10%.

Not all projects, of course, produce net savings. Midland spent $1.5-million to build a unique incinerator to burn tar wastes with little pollution. And it invested $1-million in an emergency system that will divert accidental discharges into holding ponds, a system that may never be used. But even with such pure-cost projects, Dow says, the total effort will be profitable. Says Bosscher: "Half our ecology projects at Midland yield a nice return."

### Recycling is the cheapest way to zero

All this has helped Dow to cut pollution substantially. The company has signed an agreement with the Michigan Water Resources Commission, which calls for Dow to meet strict federal-state standards by 1975. In 1970, Dow wastes heated the Tittabawassee 17° F; the heat load is now down to 10° F and by 1974 will be less than 5° F. Similar reductions are being sought for suspended solids and chemical oxygen demand. "They're ahead of schedule," reports state official John Bohunsky.

Dow's own goal is more ambitious. "We expect to be out of the river completely within three to five years," says Bosscher. That means the quality of the effluent will be no worse than the water Dow draws from the Tittabawassee. And as water standards tighten to approach the government's goal of zero discharge by 1985, Dow will undoubtedly find it cheaper to recycle all wastes, rather than treat them to purge every last drop of pollution. Already, Dow has a latex plant in



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Suppose you lived in a well-to-[illegible] tree-lined community of 30,000, and [illegible]one decided to build two large nuclear power plants right in the middle of town. Chances are you would oppose them, right? Wrong, not if you lived in Midland, Mich.

In an astonishing display of support last October, some 15,000 citizens turned out for a football-style rally urging the Atomic Energy Commission to approve construction permits for the plants. There were cheerleaders, placards, lapel buttons, bumper stickers, and stirring speeches. The crowd heard Senator Robert P. Griffin (R-Mich.) complain about the AEC's "intolerable delay" and entertainer Art Linkletter promise "to tell my friend the President" that Midland wants nuclear power. In the end, the crowd sang "We want nuclear power now," to the tune of *The Battle Hymn of the Republic.*

But behind the gaiety lay deep-seated fear. Without the 1,300-megawatt plants, the townspeople fear that Dow, the town's largest employer, will curtail operations. Dow, in turn, wants nuclear power to stabilize spiraling fuel costs and to eliminate air pollution from its coal-fired plants.

For all this support, the $500-million plants have been delayed by environmental protest ever since Consumers Power Co. applied for AEC approval in 1969. Nine groups, from the Sierra Club to the United Auto Workers, have intervened against the plant in AEC hearings. The AEC has already taken 9,000 pages of testimony, and will decide when its hearings end late in 1972.

Like other nuclear controversies, the Midland fight is exceedingly complex, fraught with conflicting "expert" testimony, arcane technology, and chilling phrases like "maximum hypothetical accident." Yet the main question is clear: Are nuclear plants safe enough to be built in an area that houses 400,000 people within a 50-mi. radius?

**A formula.** When approving nuclear sites, the AEC normally applies a formula that considers population distribution, radiation dosage, and other factors. The formula permits a plant to be built in populated areas if it "includes appropriate and adequate compensating engineered safety features." For Midland, the main compensating feature is an emergency core cooling system (ECCS) that Babcock & Wilcox has designed for the reactor.



A football-style rally of 15,000 strong urged AEC approval for nuclear plants.

Similar to other systems on reactors now operating, the ECCS is a backup system designed to prevent one of the most-feared nuclear accidents—a "meltdown" of the fuel rods that would occur if the reactor lost its primary cooling fluid. Such an accident could release dangerous levels of radiation.

But environmentalists charge that the ECCS has never passed tests under operating conditions, either on ECCS-equipped reactors already built or in experimental runs. Indeed, the AEC admits that small mock-up versions of a reactor fitted with a simulated ECCS failed six loss-of-coolant tests last year at its Idaho test facility. And full-scale tests of emergency cooling techniques are not scheduled until 1974, presumably well after the Midland decision is made. Says Senator Mike Gravel (D-Alaska): "It defies my understanding how the AEC could license a single nuclear power plant before such tests are done. It's like putting an untested airplane into commercial service."

The AEC, however, relying on extensive computer analysis, insists the ECCS will work. And it has incorporated the Idaho test findings into new regulations that it says will prevent meltdown if primary coolant is lost. Just to make sure, the AEC's new boss, James R. Schlesinger, has ordered new rule-making hearings this month on emergency core cooling. But nothing short of a full-scale test will satisfy the critics. "If they could show the cooling system would work under meltdown, we'd go away," says Myron Cherry, a lawyer for the environmentalists.

**Dow's interest.** For Dow, the outcome is critical. Though not about to desert Midland if the AEC vetoes the plants, Dow would undoubtedly shift much of its planned expansion from Midland to Texas, where fuel costs are 50% cheaper. Nuclear power would not equalize those costs, but it would provide a guaranteed source of power at a reasonably stable price. Now, Midland depends on 100 carloads of coal shipped every other day from Ohio.

Moreover, by purchasing one-fourth of the nuclear plants' output, Dow will be able to close its coal-fired plants, which spew tons of fly ash and sulfur oxides into the air every day. Though the plants violate Michigan air standards, Dow is allowed to operate them pending the nuclear construction.

The company has managed to cut some pollution by partly converting from coal to natural gas. But, says Midland manager Harold Bosscher, Dow cannot convert further because "we cannot get enough gas at any price." Without nuclear power, the only other choice is to equip the fossil-fueled plants with expensive precipitators and scrubbers, but even that would not eliminate the pollution completely. Says Chairman Carl A. Gerstacker: "There will always be more pollution in Midland without nuclear power."

Georgia that features complete recycling, one of the first in the country. A second zero-discharge plant, a chlor-alkali facility at Midland, is under construction.

Curiously, there is very little altruism evident in Dow's program and scant talk of "corporate responsibility." Instead, Dow seems motivated by hard-headed business judgments stemming from the company's unusual circumstances in Midland. Started there in 1897 by Herbert Dow, the sprawling complex now produces one of the industry's most diverse array of chemicals: some 500 product families ranging from consumer goods, such as Saran Wrap, to tongue-twisting industrial chemicals like Isopropylidenediphenol. Yet, unlike the large complexes on the Houston Ship Channel or the Gulf Coast, Midland has only the tiny Tittabawassee. With a flow of only 200 cubic ft. per second (the Detroit River, by comparison, flows a thousand times faster), the Tittabawassee has always had a limited capacity to assimilate pollutants. As far back as the 1920s, Michigan was after Dow to clean up.

By the 1930s, when Dow's Midland assets were only $25-million, the company had $1-million invested in pollution control. Thirty years later, Midland had 400 acres devoted to production and another 400 acres for waste treatment. "The outhouse was getting bigger than the house," Dow men like to say. And yet the Tittabawassee was still hot with Dow waste water and choked with Dow chemicals. Whatever fish managed to survive were killed by particularly toxic discharges that occurred frequently.

When the environment movement shifted into high gear in 1969, Dow



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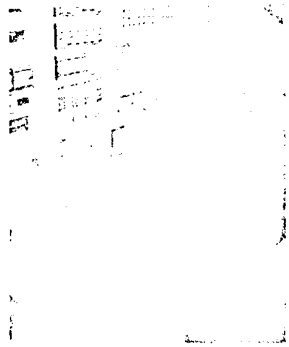
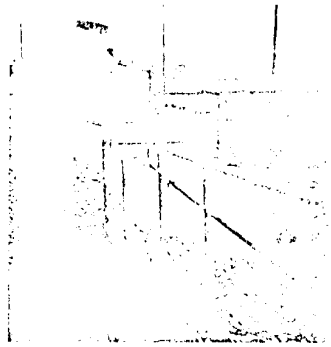
Shannon shows Otis trout being raised in water from Midland plant effluent.



Shannon and Otis check meters in a process to purify and recycle brine.



Trickling filter is part of secondary treatment of waste water at Midland.

realized that the problems of a big plant on a small river would never be solved by treatment plants alone—not without putting Midland at a cost disadvantage vis-a-vis Texas-based producers, including Dow's own Freeport plant. There has long been a rivalry between Midland and Freeport (some say tension), and internal factions wanted to limit Midland expansion in favor of Freeport. Dow simply had to find ways to offset the growing environment costs at Midland, and that meant critical reexaminations of every single process.

In a sense, it was like trying to use the squeal of the pig, for Dow was, and still is, one of the most efficient chemical companies. In an industry that has been plagued by overcapacity and intense price competition, Dow's operating profit margin of 24.5% is well above the industry average of 18.7%.

### A key to the plan is decentralization

In late 1969, Dow started its big push. Julius E. Johnson, director of research, suggested that the company establish a high-level ecology council to formulate policy and map guidelines. Soon a 12-man committee, including Dow's chairman, president, and three other board members, began meeting bi-weekly. The council had three basic goals: eliminate pollution, find ways to offset the costs, and decentralize the program to reach every plant within a manufacturing complex. "We had to get the program down to the product departments," recalls Chet Otis, a former agronomist who was named director of the council. "That's where the problems were, that's where the responsibility had to be."

The ecology council then set up 24 subcouncils, including four abroad, to cover every division and product line. The Midland subcouncil, for instance, meets weekly to analyze pollution problems, devise process changes, and plan emergency procedures. Here, too, the aim is decentralization, to achieve what Bosscher calls "building-to-building accountability." Thus, when planning the cooling towers, Bosscher chose 28 small towers, rather than one or two large ones, so that each foreman would be responsible for his own.

The ecology council took several other important steps:

- Decreed that every capital request identify pollution problems and their proposed solutions. "We don't approve spending plans until pollution is in hand," says Gerstacker.
- Required research groups to file statements assessing the environmental impact of their projects. By sensitizing researchers early, Dow hopes to avoid problems later.
- Established the 23-man Environmental Research Laboratory to find ways of preventing waste or converting it to usable by-product. The lab does not consider waste treatment.
- Set up a panel, the Environmental Testing Advisory Board, that studies new products to minimize their ecological hazards. It also advises industrial customers how best to dispose of Dow products, a concept Gerstacker calls "product stewardship."

All this, of course, has not removed Dow from the ranks of corporate polluters. Indeed, in the midst of its stepped-up campaign, Dow was indicted for dumping 30 lb. of mercury a day into the St. Clair river from a chlorine plant in Canada. Dow has since cut its discharge to 0.5 lb., and will soon convert its Canadian chlorine production to a diaphragm cell process that uses no mercury. Dow's U.S. plant's have already switched.

More serious, the environmental fervor evident at Midland has been slow fanning out to the Texas division. Though Freeport has few serious air pollution problems, largely because it is fueled by clean-burning natural gas, it dumps large quantities of suspended solids and other pollutants into the Brazos River and the Gulf of Mexico.

Unlike Midland, Freeport is mainly a large-volume producer of basic chemicals, and that creates somewhat tougher problems. Moreover, Texas authorities are only now beginning to crack down, partly in response to pressure from the Citizens Survival Committee, an outspoken local group. The federal Environmental Protection Agency has also started to push Dow, and EPA's enforcement director in Texas reports that Freeport has stepped up its recycling and waste collection techniques. "They are now moving the way we want them to," he says.

### Selling a pollution control system

As standards tighten, it will become increasingly difficult for any company to offset pollution control costs completely. But Dow expects help from its Environmental Control Systems group, which packages technical skills and products, such as chemicals and filters, and sells them to municipalities and other companies. Uniroyal Inc. and Minnesota Mining & Mfg. Co. both hired ECS to help solve tricky abatement problems. After a slow start 12 years ago, ECS is now producing annual revenues of about $10-million, and in 1971 turned a small profit for the first time.

For now, Dow is clearly on the right track, and its experience offers encouraging evidence that well-managed companies can abate pollution at minimum cost—and perhaps even earn a buck in the process. Says a confident Gerstacker: "There's a profit opportunity in pollution prevention that we have only just begun to realize." ■



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