Chemical & Engineering
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CHEMICAL MAKERS UP ANTE FOR POLLUTION

The Manufacturing Chemists Association last week released the most comprehensive, up-to-date report yet on chemical industry spending for pollution control. It indicates that chemical makers are stepping up their continuing battle against pollution along all major fronts.

- The industry invested some $266 million in pollution control facilities during the five-year period 1962–66.
- Projected additional commitments for facilities total at least $405 million for the five-year period 1967–71.
- Research spending for air-pollution control by 1967 tripled—and doubled for water pollution—from those reported in a 1962 MCA study.

"If there is any reading between the lines here, it is that the chemical companies, like other industries, have truly taken to heart the critical challenge of maintaining the natural environment . . . ," MCA president Gen. George H. Decker said.

The report covers 129 major U.S. firms and 12 Canadian ones. While MCA's 1962 study covered air and water pollution, the current one also includes data on industry's efforts in solid-waste disposal. MCA notes that, though survey response was incomplete, the data given represent a major part of chemical manufacturing at the time of the survey. Also, MCA is not sure that all of the plants reporting in the 1962 survey, and still in operation through 1966, furnished data in 1967.

Nevertheless, the 1967 report clearly indicates that chemical makers have made substantial progress toward controlling pollution, MCA says. "The task is not finished and the industry is fully aware of the work yet before it."

The report, "Toward a Clean Environment," points out that the U.S. chemical industry through 1966 invested $673 million in pollution control facilities alone. MCA estimates that about $266 million (about 40%) of this investment was spent within the 1962–66 period—more than double an earlier projection of $119 million for facilities. MCA considers that the $405 million projected for 1967–71 is conservative.

FMC's Emmet F. Spencer, Jr., a member of MCA's air quality committee, said that 5% of total new capital investment is "roughly" what companies are spending for control facilities. "It's simply a recognized cost of doing business," he said.

Spending for pollution control facilities, however, is only a part of industry's battle to control air and water pollution, the report shows. By 1967 the cost of operating and maintaining the facilities topped $100 million annually—up 58% from 1962.

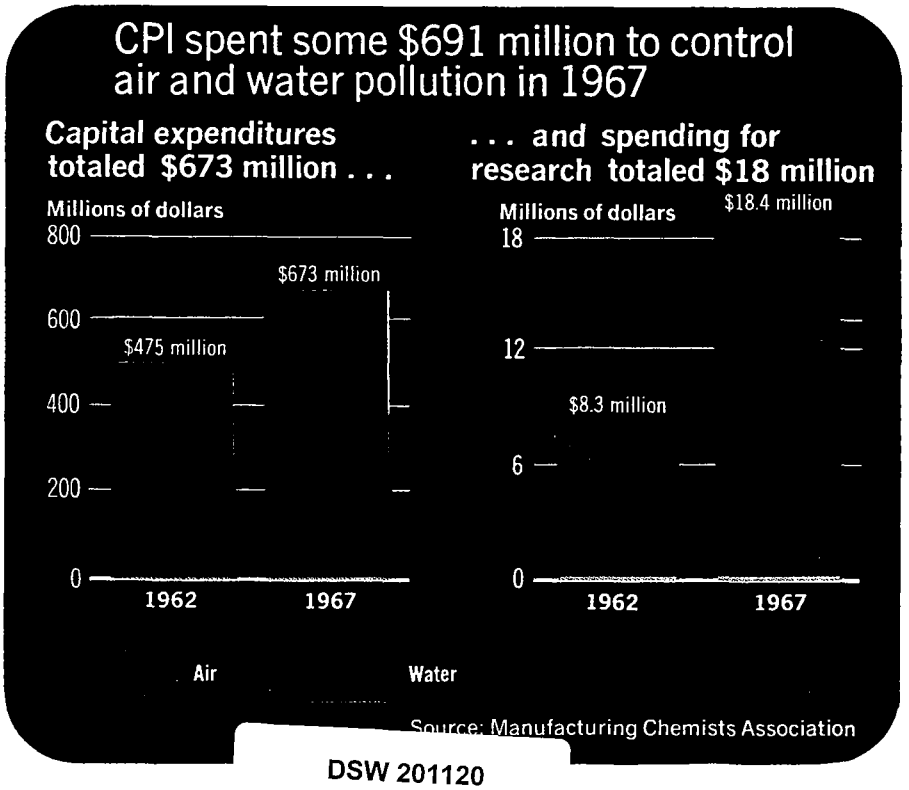
On another major front—air and water pollution research combined with solid-waste disposal research—chemical companies spent an annual average of $19 million during 1962–66. This includes $2.1 million support from the Federal Government for the five years.

By 1967 more than 4800 employees were engaged in the industry's antipollution program. Gen. Decker gave particular credit to company scientists who are working to solve not only the chemical industry's environmental health problems, but who also "provide the chemical knowledge to contribute to all industrial and governmental efforts in this critical field."

Indicative of the industry's continuing emphasis on keeping the environment clean is that of some 9000 chemical manufacturing processes covered in the survey, about one third had no routine emissions to the atmosphere. And of those that did have such emissions, 80% had installed controls that reduce inorganic emissions from chemical operations by 68% and organics by 56%.



MCA's Decker
Maintaining the natural environment



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INSTRUMENTS:
Pitt Conference Opens

If any analytical chemists went to Cleveland last week still unconvinced that the computer would be a prominent part of their future, they could hardly have left in the same condition. Even a quick look at the instrument exhibits at the Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy—held in Cleveland for the second year—showed that the computer's influence on analytical instruments and techniques is widening.

More instruments are being designed with computer adaptability in mind—Philips Electronic Instruments' new electron probe microanalyzer, for example, with its stepping motor drives and digital control circuits. With gas chromatography, almost off-the-shelf systems for simultaneously handling multiple chromatographs have evolved still further, with new equipment and systems from companies such as Digital Equipment Corp., Electronic Associates, and Infotronics. Hewlett-Packard's new gas chromatograph provides punched tape readout for transmission over Teletype to a time-share computer. Philips Electronic Instruments has brought its parent company's computer over from Europe to form a part of its new computer-control x-ray spectrometer system. Significantly, a time-sharing computer service company—Com-Share, Inc.—joined the list of exhibitors for the first time.

Not only the exhibits, but the technical sessions as well, reflected the growing influence of computers. A day and a half of the program was devoted to computer applications, ranging from use with gas chromatographs to structure elucidation of organic compounds.



Pittsburgh Analytical Conference
Once again in Cleveland

Conference officials are so pleased with Cleveland that the conference has been scheduled there through 1974. The conference this year is the largest in the meeting's history with 250 exhibitors, 300 technical papers, and about 6000 attendees.

The conference, jointly sponsored by the Analytical Chemistry group of the ACS Pittsburgh Section, and by the Pittsburgh Section of the Society of Applied Spectroscopy, was held for its first 18 years in Pittsburgh's Penn-Sheraton Hotel. However, labor disputes there two years ago forced the conference to move.

MOLECULAR BIOLOGY:
DNA Photographed

Watson and Crick were right. Scientists have known that for some time, of course, but workers at the California Institute of Technology have now directly observed and photographed the double helix of DNA (deoxyribonucleic acid). Caltech graduate student Jack Griffith, who works with biology professor James Bonner, showed the electron micrograph to a meeting of the Biophysical Society in Los Angeles. At a magnification of 7,300,000 a portion of the long DNA molecule is clearly seen to be two separate strands helically wound about each other. They are clearly resolved and show a pitch of 34 A. Griffith is quick to point out that this result in itself doesn't mean much.

The details of DNA's structure have been amply elucidated from x-ray data. The picture is aesthetically pleasing, but no new conclusions follow from it. It so happens, he says, that a portion of the DNA chain was lying on the substrate in just the right way, at just the right angle, and with the right amount of tungsten shadowing. The micrographs, which show a resolution of about 20 A., were made by refining and pushing the techniques of electron microscopy to their limits. In this sense, Griffith says, the DNA picture is significant. It means that some of the details of biological processes involving proteins, nucleic acids, and other large molecules can be studied directly using the electron microscope. In Dr. Bonner's laboratory, for example, the technique is valuable in studying genes and how information is transferred from DNA to the cell.

Griffith displayed other micrographs that showed histone proteins sitting on certain genes, thereby inactivating them. Active DNA, which can transcribe information, is uncoiled, contains few histones and many nonhistone proteins. Inactive, coiled DNA, on the other hand, has histones in about a one-to-one ratio. DNA is not coiled without histones, Griffith adds. "Histones appear to confer on DNA the ability to coil. If enough histone is removed to uncover a gene, then that segment of the DNA uncoils," he says. One gene takes up about 80 turns of DNA's double helix, or a length of about 3000 to 4000 A. It takes about 50 histones to inactivate one gene. Other micrographs show blobs that are believed to be enzymes attached to the DNA. These may be RNA polymerase, which carries DNA's instructions to other parts of the cell. The key to the technique used at Caltech is sparse use of tungsten shadowing.



DNA double helix
Magnified 7.3 million times

FUNDING:
Subcommittee Abolished

Another special subcommittee, formed to give Congress a better idea of how well federal agencies are spending money allocated for research and development, has gone out of business. This time the unit is the Subcommittee on Research and Technical Programs of the House Committee on Government Operations. It was headed by Rep. Henry S. Reuss (D.-Wis.). Several weeks ago it was revealed that the Senate Subcommittee on Research was winding up its affairs, preparatory to shutting up shop Aug. 1 (C&EN, March 3, page 25).

The Reuss subcommittee was created in 1965 as a direct result of a study made by the House Select Committee on Government Research. This *ad hoc* group was headed by

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