File Case work - background grounds
waste, Environm.

Hazardous wastes at Love Canal: What are effects?

Panel report concludes no ill effects are evident, but warns they're possible
Attacks EPA-sponsored study as "paradigm of administrative ineptitude"

Love Canal. The words have come to be synonymous with the public perception of the carelessness of the chemical industry in disposing of hazardous wastes. But, amid the public clamor, sparked by extensive media coverage and regulatory agency conflicts, the true facts of this case have been difficult to pinpoint. Was Hooker Chemical grossly negligent? Are the local residents in danger of increased risk from cancer and birth defects?

There are conflicting answers to these questions. But the first major effort to clear the air has been made by the Panel to Review Scientific Studies and the Development of Public Policy on Problems Resulting from Hazardous Wastes. The panel was appointed by New York state Gov. Hugh Carey and the state legislature.

The panel was chaired by Lewis Thomas, Chancellor of the Sloan-Kettering Cancer Center and included Saul J. Farber, Dean of New York University Medical Center, Richard A. Doherty, of the University of Rochester Medical Center, Attallah Kappas, Physician-in-Chief of Rockefeller University Hospital and Arthur C. Upton, Chairman of New York University Medical Center's Dept. of Environmental Medicine.

What follows is an edited version of that report. It is critical of government agencies and some of the so-called scientific studies that have been done. It concludes that no health effects have been demonstrated but warns that such effects have not been ruled out.

We are presenting this study because of the involvement of chemicals and the obvious need for chemists to learn of and understand some of the scientific information and misinformation involved in studies done and still pending. The panel report is not without its own critics. But the report gives a clear picture of the confusion and complexities involved in this matter. Hopefully, it will help us learn from past mistakes.

The condition of chemical pollution in the Love Canal area became a matter of national public concern in the Spring of 1978, followed by the publication by the New York State Department of Health of a brochure entitled "Love Canal—Public Health Time Bomb" in September 1978. The language employed in this report was strong indeed: the situation was an "environmental nightmare," capable of causing "profound and devastating effects," constituting a condition of "great and imminent peril."

The Love Canal—Public Health Time Bomb publication was a special report to the Governor and Legislature which described the chronology of State actions and findings culminating in the declaration of the existence of an emergency by the then Commissioner of Health, Robert P. Whalen, M.D.

The record of Love Canal events indicates clearly that an articulated and coordinated federal and state approach was not achieved and has not been achieved to date

The declaration of an emergency by the Commissioner of Health was a requisite to insure adequate jurisdiction and resources for governmental response to the Love Canal situation; it was also in support of an application to the Federal government for a declaration of a national disaster, which would make available additional resources. The Panel also understands that a finding of "great and imminent peril" was a statutory requirement.

With this rhetorical setting of the stage, it might reasonably have been predicted that a concerted, coordinated and intensively organized series in Federal-State scientific studies would have followed, laying out the problem in all its dimensions and providing a solid base of data as a foundation for public policy in coping with the problem.

Something went wrong, however, and now, two years after the printing of "Love Canal—Public Health Time Bomb," we face almost the same set of urgent questions as were posed at the first recognition of the problem, and we have almost no clear-cut, unequivocal answers.

In the view of this Panel, what went wrong was not that the problem was neglected or put to one side: an immense amount of hard work was performed by a large number of qualified investigators from State and Federal agencies. In addition, there has been much effort put into this problem by groups of well-intentioned private individuals including certain studies lacking in scientific design and skill.

The chronology of Love Canal events clearly demonstrates early and frequent consultation by the State with the Federal government on the subject of health effects studies. The record indicates just as clearly that an articulated and coordinated Federal and State approach was not achieved and has not been achieved to date. For example, a 1978 State request for funding of health effects studies, including chromosomal studies, was rejected by the Environmental Protection Agency (EPA), while that agency later undertook to fund a limited and controversial study of chromosomal damage almost two years later, without the participation or consultation of the New York State Department of Health. A central flaw in all this work was its almost total lack of coordination, and an appalling absence of communication among the various groups of scientists involved. At no point in the past two years did anything like a master plan emerge for assembling the kinds of information required for analyzing and comprehending the problem.

With the absence of a coordinated plan there was also the absence of an understanding by both the public and government officials of the nature and limitations of past or anticipated scientific inquiries. A demonstration of health effects due to chronic exposure of multiple hazardous chemicals is an exceedingly complex scientific problem. There appears to have been little understanding at the outset of the nature of the requisite clinical and epidemiological inquiries, the length of time necessarily associated with these studies, and most importantly, the expected outcomes of the studies.

The net result is today's state of ambiguity around the most important and urgent question concerning the public health: Has the health of the people residing in the polluted zones at Love Canal been damaged and if so, in what ways? Are there reasons to fear further damage in the form of disease states within this population in the years to come?

Meanwhile, because of this ambiguity, the people most directly affected by the conditions at Love Canal have been subjected to more than two years of the most intense anxiety and fear. In the absence of clear-cut, authoritative answers, many of the residents have come to believe that their health is in fact irreversibly damaged, that they are at future risk of cancer, congenital malformations in their offspring, and an increased incidence of miscarriages and abortions. At the same time, adding to their anguish, the investments made by homeowners in their property have lost all or nearly all of their original value, with no kind of assurance that the value will ever return.

This Panel recognizes that there was a reason

Wide World Photos

Barbara Blum (left) led EPA's efforts at Love Canal, which study criticized for "lack of scientific vigor." Federal Emergency Management Agency, led by John Macy, Jr. (right) also took part in cleanup.

for the State Health Department's initial announcement of "Public Health Time Bomb," but not a good enough reason. There ought to be a better mechanism for convincing the Federal government that a certifiable disaster area exists, in order to obtain Federal funds, than to arouse such fears of imminent peril as swept through the Love Canal area in this case. A better mechanism might have been found if effective Federal/State consultations had been launched promptly when the problem was first recognized. It may be that the atmosphere of public near-hysteria which was created in mid-1978 contributed to the failure on the part of public health agencies to put together an appropriately orderly, deliberative and systematic investigation of the situation.

Whatever else may be going on, there has not been a sufficient concentration of toxic material to produce overt illness that is attributable to poisoning

This Panel acknowledges that the Love Canal problem was something quite new, a situation not encountered before by public health agencies. In the past, instances of environmental pollution emerged as sudden, acute episodes, usually derived from a single industrial source, with readily discernible and quantifiable health hazards. Love Canal, in contrast, represented the chronic contamination of a whole community's living space, extending back over a period of decades, and most complex of all, involving not one but scores of different chemicals seeping through the earth and into households all at once. No book of rules exists for handling this kind of problem, but from now on it is obvious that rules will have to be formulated.

How much health hazard?

It is clear enough from the available data that no *acute* cases of intoxication by chemical pollutants have been observed within any part of the Love Canal community, "wet" or "dry." That is, no clusters of cases of acute liver disease, or kidney disease, or pulmonary manifestations, or hemolytic anemia or agranulocytosis, and certainly no peripheral or central nervous system syndromes. Whatever else may be going on, there has not been a sufficient concentration of toxic material to produce overt illness attributable to poisoning.

This was clear enough from the outset. The real worry for the community, and for the Health Department, was about more chronic forms of disease, with long-term hazards to health. The two hazards uppermost in the minds of the Love Canal residents are, and have been for the past two years, the risk of cancer and the risk of reproductive abnormalities.

To date, the questions remain unsettled. There are on the record three reports bearing on the problem of chronic disease, each of which has become the basis for widespread publicity and compounding apprehension within Love Canal community. These are (1) the EPA-sponsored cytogenetics study, (2) the peripheral nerve-conduction study by Dr. Steven Barron and associates, and (3) the epidemiological study of pregnancy disorders, birth defects and related illnesses by Dr. Beverly Paigen.

In retrospect, the EPA-sponsored cytogenetics study represents a paradigm of administrative ineptitude, with all the defects to be expected when one governmental agency undertakes work in a highly sensitive area without knowledge, consultation or prior review by another agency with heavy responsibilities for the same problem.

It is known that certain chemical toxins can produce abnormalities in the structure of chromosomes, which can then be visualized in cultured leukocytes taken from the circulating blood. The technique for such examinations is well recognized, although the health significance of chromosomal abnormalities in cultured leukocytes remains uncertain: various degrees of breakage and deformity of the chromosomes are seen in certain transient virus infections, and a certain number of abnormalities are seen as background in populations of entirely normal people. The test may be a useful method for surveying populations, but it is of questionable significance when applied to individuals or small groups. It is without value unless the subjects being tested are matched by a control group of similar people. Moreover, the technique is complex and exacting, requiring highly skilled technicians for its performance and highly specialized professionals for the appraisal of results. In our present state of knowledge, chromosomal analysis is *by no means to be regarded as a routine procedure in public health practice.*

In January 1980, the Biogenics Corporation of Houston, under a contract with EPA, carried out a cytogenetic study of Love Canal residents. Blood specimens were obtained from 36 individuals residing in the most severely affected area and transferred to a tissue culture laboratory for culture and further treatment. The chromosomes in 11 of the 36 were regarded as abnormal, on the basis of what were regarded as chromosomes breaks, chromatid breaks and "supernumerary acentric fragments." Subsequently, a formal report was presented by Biogenics to EPA in which the following statement was made:

. . . "It appears that the chemical exposures at Love Canal may be responsible for much of the apparent increase in the observed cytogenetic aberrations and that the Love Canal residents are at an increased risk of neoplastic disease, of having spontaneous abortions, and of having children with birth defects." Following this sentence, a mildly qualifying statement is made: ". . . However, in the absence of a contemporary control population, prudence must be exerted in the interpretation of such results."

The Biogenics report was made public soon after being submitted to EPA, and received the widest possible coverage in the press and on television. The public was given the strong impression that the Love Canal pollution was endangering the survival of all contacts and their offspring. During the next few weeks the Biogenics report was reviewed by several groups of experts in the field of cytogenetics, with expressions of doubt that the reported results were of significance. These were particularly critical of the techniques employed, the lack of controls, and the possibly artifactual nature of the "super-numerary acentric fragments." The controversy continues with charges of incompetence and irresponsibility being made against the Biogenics laboratory and countercharges by the laboratory of bias and prejudice on the part of its critics. The whole affair has assumed the dimensions of a major and still unsettled scientific controversy, and meanwhile, once again, the Love Canal residents are left with even deeper causes for worry and fear.

The Panel agrees with those who have criticized the Biogenics study on technical grounds, but feels even more strongly that such a poorly designed investigation as this one should not have been launched in the first place. With so much at stake for the residents involved, to have set up experiments that lead to public conclusions of such magnitude, without prior review of the protocol by qualified uninvolved peer scientists, and without any after-the-fact, independent review by competent scientists before release of the results, was a disservice to the citizens most intimately concerned and, as well, to the public at large. The damage done by this EPA effort is perhaps beyond mending; many of the Love Canal residents have by now become so distrustful of governmental agencies and their scientific reliability that they are unwilling to believe anything except the worst of news about themselves.

There is now no question that a proper cytogenetics study is urgently needed. The Panel does not know whether the degree of chromosonal injury claimed, in the Biogenics Laboratory study, even if confirmed, is in itself a reason for alarmed predictions concerning cancer or congenital defects—indeed, similar chromosomal abnormalities are characteristically observed in other circumstances (measles, for example) without known sequelae.

A reliable and precise technology exists for the determination of the conduction velocity in various peripheral nerves, sufficiently sensitive to detect nerve damage before the development of subjective symptoms. It has proved useful in the early detection of neuropathy in diabetes, and in a variety of nerve injuries caused by toxins.

A study of a small number of Love Canal residents was undertaken in the spring of 1980 by Dr. Steven Barron, a neurologist at the State University in Buffalo, and a copy of Dr. Barron's report has been made available to the Panel.

The results of this study were essentially negative. No statistically significant difference was detected between the conduction velocity in 35 Love Canal residents and a matched control group of 20 residents of other areas. However, the author stated in his conclusion that there were "trends within the data of non-significant slowing of sensory conduction velocity" in the ulnar and sural nerves, raising the possibility that further studies involving larger numbers of subjects might indeed turn out to be positive.

While the chromosome study has assumed the dimensions of a major scientific controversy, the Love Canal residents are left with deeper causes for fear

The conduction study would need to be repeated in a much larger group of residents and under highly controlled circumstances before any serious conclusions can be reached. This is the major conclusion reached by Dr. Barron in his report. The weakness of the study lies in its inadequacy of scale, and in the elusive meaning of the terms "trends within data" and "non-significant slowing." The study illustrates the plain fact that small-scale "pilot" experiments are not appropriate for problems as large as that of Love Canal, and equivocal or ambiguous observations under these circumstances are likely to do more harm than good.

Dr. Paigen, consultant to the Love Canal Homeowner's Association since early 1978, is a Cancer Research Scientist at Roswell Park Memorial Institute in Buffalo. On March 21, 1979, she presented an extensive report on the health

problems in Love Canal residents in testimony before the House Subcommittee on Oversight Investigations.

Although Dr. Paigen is to be commended as a private citizen for undertaking on her own an extremely difficult and complex task, her report falls far short of the mark as an exercise in epidemiology. She believes fervently that her observations prove the existence of multiple disease states directly attributable to chemical pollution, but her data cannot be taken as scientific evidence for her conclusions. The study is based on largely anecdotal information provided by questionnaires submitted to a narrowly selected group of residents. There are no adequate control groups, the illnesses cited as caused by chemical pollution were not medically validated; in her comparison of the health problems of people living in the "wet" and "dry" areas no cognizance is taken of the age differences between the two groups, and the statistical methods used for analysis of the data are open to question.

The Panel finds the Paigen report literally impossible to interpret. It cannot be taken seriously as a piece of sound epidemiologic research, but it does have the impact of polemic. Obviously, the questions raised by Dr. Paigen must now be answered, specifically and as soon as possible, but this will entail a much more elaborate epidemiologic study.

Studies coming and going

The State Health Department began its efforts with a gas chromotographic survey of the chemical composition of eight sumps from the area most affected, followed by tests of air samples from the basements of approximately 700 houses, demonstrating the presence of toluene, chlorobenzene, chloroform, trichlorethylene and other volatile organic materials in the sump materials and, at low levels, in some of the air samples. Later in 1978, low levels of dioxin were found in soil from a construction pit. These studies were continued through 1979 and 1980, with testing and, analyses still in progress.

Meanwhile, epidemiologic investigations of the residents of the area were begun in June 1978 aimed primarily at determining whether reproductive abnormalities (excess miscarriages, birth defects, low birth weights) existed at levels higher than normal. The results of the latter studies were and remain inconclusive, owing in part to the relatively small population available for study and the absence of a comparable, matched population of controls with which to compare the figures. The investigators thought there might be some increase in miscarriages and infants with low birth weight, but the data cannot be taken as more than suggestive. No cases of chloracne were found, and there appeared to be no excess of cases of cancer, asthma, epilepsy, liver disease or hematologic abnormalities.

During the Summer of 1978, approximately 4000 blood specimens were obtained at 12 clinics held in the area, with essentially negative results except for a few instances of elevated enzymes employed for liver function tests, at levels of equivocal significance. In August 1978, 5000 soil samples from 700 houses were taken for chemical analysis, with results (still incomplete) similar to earlier soil studies in the area. A radioactivity survey was completed in September 1978 with essentially negative results. Over a six month period in 1978-79, medical examinations were performed on 112 construction workers employed in excavation work at the Love Canal site; apart from a few cases of transient dermatitis no disease states were encountered which seemed work-associated.

The Center for Disease Control (CDC) has initiated medical examinations for any Love Canal area residents who wish them. The Panel is extremely concerned that the purpose of this program be critically scrutinized. These examinations, if undertaken outside a carefully designed research protocol, may contribute to the clinical and epidemiological questions which must be addressed.

Over the next year, CDC will conduct an epidemiological study comparing findings in selected Love Canal residents with findings in matched individuals not from Love Canal. This study will include testing for possible chromosone abnormalities, neurological assessments and other clinical and laboratory tests.

The National Academy of Science proposed to conduct a study focusing on the complex problems associated with the assessment of the possible impact on human health from industrial wastes. The study will address scientific strategies and methods by which incidents such as the Love Canal can be investigated and data from them interpreted. The Panel feels that the review by the National Academy of Sciences will help to put the nationwide problem of industrial wastes and possible health consequences into perspective.

Epidemiologic studies in progress focus on determining the occurrence of cancer and adverse pregnancy outcomes in over 900 families who lived in the Canal area and moved away prior to June 1978. This will take two years to complete. Results will be available on comparisons of cancer and adverse pregnancy outcomes in the Love Canal census tracts with other census tracts of similar socioeconomic level. In the laboratory, a large number of soil samples are yet to be tested. Teratologic and pathologic effects of Love Canal soil and air above soil are being studied in rats. The Panel feels that these studies should continue, but all of them should have the benefit of external review by expert scientists in the fields involved.

(Continued on page 32)

Wide World Photos

URL 04813

The atmosphere of public near-hysteria, created in mid-1978, which led residents to evacuate Love Canal homes, contributed to the failure of public health agencies to put together an orderly, and systematic investigation.

Computer chips cause revolution in chemical analysis

(Continued from cover)

It's the microprocessor-controlled instrument that has opened the way to their analytical revolution by making sense out of all the data the instruments generate. Within the five years or so that these tools have been on the market, manufacturers have been able to move into second and even third-generation instruments. Each phase offers simpler operation, and greater reliability at less cost.

As a result, the market for microprocessor-based instruments has been growing by leaps and bounds. A September 1979 survey reported that 1,550 microprocessor-based gas chromatographs (GC) were in use. Of those, 539 were in industry. And organic chemicals, with 84 for research and development and 44 for quality control, was the biggest user.

But liquid chromatography (LC) instruments are the fastest growing. Robert Graf, product manager at Varian Instruments, estimates the LC growth rate at 25-45%. He puts the figure for GC equipment at 10-20%. Graf says the sales of LC instruments with miniature data processing systems is about $200-$400 million/year.

That figure agrees with the estimate of Michael Tarter, laboratory data control product manager for Electron Associates (Long Branch, N.J.). But Tarter cautions that "any company doing less than $200,000 in annual sales will find it difficult to justify such systems."

And some bigger companies don't think they are justified either. An official of the central laboratory of one major chemical company tells *Industrial Chemical News* that having microprocessing systems for chromatographic analysis operations "would be quite handy, but in terms of our overall priorities, we just don't have the funds."

Freeing the chemist

There are plenty of large companies that are able to absorb the continuing developments in microprocessor-based equipment. These developments are freeing the bench chemist from routine operations, such as overseeing the chromatography operation. When should the temperature be raised? When must more material be added? The chemist no longer has to ponder those questions, the machine now makes the decisions, comments Nesbit.

Can the machine make all of the decisions? Not by a long shot. "Bench chemists should be under no illusion that any automated chromatographic analysis is completely infallible," warns John A. Schmit, product manager of Du Pont's analytic instrument division. He cautions that backup systems, or even redundancy, is needed to "guard against the unexpected."

Increasingly, as manufacturers become aware of chemists' needs, systems are built "smarter." According to Peter Mansfield, marketing director of Altex Scientific, a division of Beckman, "in the early days we didn't fully appreciate the real need of bench chemists, which was a fool-proof system."

One midwestern manufacturer reports having gone through three different data processing systems in attempts to standardize the chromatography columns they were making. Their problem was aggravated by their lack of familiarity with electronics and computers and their inexperience in coping with software development.

They finally had to settle for a system built of components from various suppliers. Result: when the system goes down, the start-up is extended because of the coordination and servicing required among the different suppliers.

The major difficulty appears to be in interfacing the chromatographic analyses with the data processing requirements. "That's where the major problem lies," says A. Tulumello, an instrumentation consultant in Lyndhurst, N.Y. Tulumello suggests a way around this predicament. The place to start, according to Tulumello, is to recognize that the analytical instrument itself puts out a voltage signal that has a specific intensity. This has to be converted so that the microprocessor can handle it. He suggests that there are a variety of interchangeable panel boards available to do the job.

The next consideration, he says, is what to do with the processed data. In addition, the form in which it is to be presented must be decided upon. "Difficulty sometimes arises when there is a need to integrate a host of variables, which are not necessarily exclusively associated with the chromatographic analysis," says Tulumello. "This is where consultants and customized equipment system suppliers can be helpful," he concludes.

Equipment suppliers are often caught in the crossfire of the user's interface needs. "We are sitting on a steep curve of development and evolution for these systems to meet our customers' needs," says Rani Shatz, a product manager at Computer Inquiry Systems (Waldwick, N.J.). "Frankly, it's damned difficult just keeping up." According to Shatz, the company now gets requests to supply miniature data processing systems that can handle the output from up to 80 different analysis instruments. So much interfacing not only means the ability to convert many different analog signals, but also requires a high degree of sequential logic to manage, store and integrate the data into a useful form.

The area of highest interest for interfacing, according to Shatz, is that of remote control and continuous feedback, as, for example, in temperature programming of chromatographic analyses.

"Most of our problems are with the software," says Stauffer's Pat Malacuso. "When we look for outside specialists we want people who not only know the hardware but also have demonstrated problem-solving ability with software. We are strong believers in service contracts once all our start-up problems are resolved," he says.

Users want more

Five years ago, Nabisco's laboratory in Fair Lawn, N.J. was using single-dedicated, multipurpose units exclusively. They became obsolete when there was no longer software available to handle the increased workload, according to Nabisco's Charles Sodano. The system was replaced by a multi-channel data processing unit.

But that system also has been unable to keep up with the heavy demand imposed by the number and diversity of chromatographic analyses being done at the lab. Next step for Nabisco, still under consideration, is a system that interfaces an enlarged minicomputer with designated microprocessing units. It will be designed to meet storage and retrieval requirements for information accessing; requirements they cannot get easily with their present system, according to Sodano.

Says Sodano: "How big you are has a great bearing on the amount of data processing support you need."

Hoffmann-La Roche, for one, is increasing its data processing support for the company's quality control labs. James Johnson, manager of Hoffmann-La Roche's product development, says the lab is changing from single-dedicated units to a multi-channel system.

"It's simply a matter of economics," Johnson claims. The new $150,000 system will be able to handle up to 30 different individual chromatographic analytical units. The company found that the breakeven point for the new system was equivalent to eight separate single-dedicated units. The individual units, which cost $25,000, include both microprocessing and analytical sections.

Johnson says that in considering future expansion requirements, the company found the changeover involved lower initial costs as well as lower labor costs. Present plans call for Hoffmann-La Roche to interface 15 instruments with

General Electric Photo

A microprocessor chip (shown enlarged 25 times) of the type now used in analytical equipment.

Hazardous wastes at Love Canal: What are effects?

(Continued from page 17)

What to do next

The Love Canal dilemma is perhaps the most complex public health problem to confront New York State in many decades, and it demands for its appraisal and ultimate solution an array of scientific disciplines well beyond the scope of conventional medical or public health practice; it contains intricate problems for toxicology, oncology, industrial hygiene, genetics, developmental biology, psychology, economics, organic chemistry, physics and geology, to name only a partial list.

Much of the anxiety caused for the Love Canal residents might well have been averted if a *single* Federal-State group had evolved early in the history of this situation and if public pronouncements were made only by this group and limited to the exactitudes permitted by the current state of scientific knowledge. Nowhere for example have we seen a proper qualification of the meaning of toxicological findings in terms of the vast uncertainties of host responses. Evidence of chemical pollution is disturbing in an absolute sense; but in the face of the reality—which prevails in a vast number of settings other than the Love Canal area—the issues are those of actual, definable damage, of remedy to the extent that current knowledge permits, and of prevention in the future. The scientific evidence, incomplete though it is, reveals no state of population damage justifying the terms "imminent peril" and "profound and devastating effects." The promise of "remedy" implicit in the pronouncements of the EPA in this situation is illusory since neither the quantitative nor the qualitative aspects of the possible risks are known. And the manner in which prevention of situations like that enveloping the population and area surrounding the Love Canal can be prevented in the future remains yet unclear.

The events surrounding the Love Canal demonstrate the need for the assignment of a lead Federal agency to direct all Federal involvement in health effects studies of hazardous wastes. The Panel recommends that either the Center for Disease Control or the National Institute for Environmental Health Sciences be so assigned. The Environmental Protection Agency has not demonstrated the capacity to design and implement health effects studies in a scientifically rigorous manner.

The Panel further recommends that the Federal lead agency be the single point of Federal decision-making on the design and implementation of health effects studies regardless of source of Federal financing.

The Panel recommends, given the jurisdictional responsibility of the State public health authorities in these matters, that no Federal sponsorship of health effects studies either directly or by contract be undertaken without at least the consent, and preferably the active participation, of a State public health authority.

Wide World Photos

Panel blames chemical hysteria on agencies' failures.

The Panel recommends that a specific and detailed protocol for coordination of health effects studies and other related health concerns regarding hazardous wastes sites be developed between the New York State Department of Health and the Federal government lead agency.

The Panel recommends that no health effects study of State or Federal sponsorship be initiated without a rigorous peer review of study design, methodology, and procedures similar to reviews conducted by the National Institutes of Health.

The Panel further recommends that non-governmental sponsors and investigators of health effects of hazardous wastes also seek out the highest caliber peer review of research proposals prior to implementation.

The Love Canal problem is a paradigmatic example of government decision-making at the outer bound of scientific knowledge. With a literally exponential growth in information and awareness concerning environmental contaminants and human health has also come a greater appreciation of the limitations of what we can know with certainty. Dialogues of hazardous wastes, air pollution, water quality, nuclear wastes and other environmental problems now center on such imponderable and ambiguous subjects as risk assessment, acceptable levels of voluntary and involuntary risk, and benefit/cost analysis. While the Panel believes it is important to improve public awareness of the current limitations of science with respect to environmental hazards, the critical failure in the past two years has been the inconclusiveness of studies carried out to date. Where improvements in public and decision-maker understanding might have been achieved, only further questions and debates on scientific credibility have been the result.

We recommend the creation by the Governor of a Scientific Advisory Panel, composed perhaps of 10 to 15 scientists, representing expertise in all of the technical disciplines involved in the Love Canal problem. This should not be an ad hoc committee with the charge to look into the matter and then to emerge with quick questions and answers.

We suggest that the mode of operation of the Scientific Advisory Panel be patterned after that of the President's Science Advisory Committee (PSAC) which functioned with great value to the country from the time of its inception in the Truman administration until its termination by the Nixon administration.

We recommend that the Advisory Panel be given access to all material bearing on the Love Canal problem, that it carry a particular responsibility for reviewing and advising on all new scientific studies while they are in the planning stage, and that it examine all reports (or, where necessary, obtain reviews by subpanels of its own creation) before they are issued as public documents by the State or any collaborating Federal agency.

We believe the special Panel will provide a needed organizational focus for advice on government decisions affecting a wide range of environmental problems with potential health effects. We also expect that this special Panel might provide a resource for advice to the Governor on a broader range of scientific questions facing State government.

(Editors' Note: To our knowledge, none of these recommendations has yet been followed.)

Catalysts

Ziegler type catalyst system. *Assigned to Exxon Research & Engineering Co., Florham Park, N.J.* Patent Number 4,224,181.

A catalyst composition which comprises a mixture of four ingredients has won a patent for Exxon Research & Engineering. The first is at least one supported Group IVB to VIII transition metal halide. The second is a trialkyl metal cocatalyst having the structure of R'_3Y in which R' is selected from the group consisting of C_1 to C_{20} primary alkyl, secondary alkyl, tertiary alkyl, neopentyl alkyl, branched alkyl, naphthenic or aralkyl groups and Y is selected from the group consisting of aluminum, gallium and indium. A nitrogen-containing metal alkyl compound is the third ingredient. Its structure is selected from the group consisting of R'_2YRN_2 or $R'XYNR_2$, in which Y is selected from the group consisting of Al, Ga and In, X is a halide and R' is a C_1 to C_{20} primary alkyl, secondary alkyl, tertiary alkyl, neopentyl alkyl, branched alkyl, naphthenic or aralkyl group and R is selected from the group consisting of C_3 to C_{20} bulky alkyl, cycloalkyl, aryl. The two R groups can be taken with N to form a pyrrolidyl or piperidyl and the alkyl substituted derivatives of pyrrolidyl and piperidyl. The compound is in a mole ratio of about 0.5 to about 200 of the compound to the transition metal compound. Finally, at least one Lewis base is included. The Lewis base must not cause excessive cleavage of metal-carbon bonds or loss of active sites.

High efficiency catalyst for polymerizing olefins. Assigned to The Dow Chemical Company, Midland, Mich. Patent Number 4,224,186.

Dow has obtained a patent for a catalytic reaction product of a tetravalent titanium compound, an organoaluminum compound, an organomagnesium component and a halide source. The catalytic reaction product having atomic ratios of Mg:Ti if from about 1:1 to about 2000:1; Al:Ti is from about 0.1:1 to about 2000:1; excess X:Al is from about 0.0005:1 to about 10:1. The improvement in this patent involves employing as the halide source in the catalyst a tetravalent tin halide represented by the formula SnX_eR_{4-e} in which X is a halogen, R is a hydrocarbyl or hydrocarbyloxy group and a has a value of 1 to 4 and the atomic ratio of Sn:Mg is from about 0.01:1 to about 500:1.

Olefin oxidation catalyst and process for its preparation. Assigned to Celanese Corporation, New York, N.Y. Patent Number 4,224,187.

A process for preparing an oxidation catalyst has been patented. The catalyst corresponds to the formula in which Mo, Co, Fe, Ni, Bi and O are respectively the elements of molybdenum, cobalt, iron, nickel, bismuth and oxygen; L is at least one element selected from potassium and rubidium; M is at least one element selected from phosphorus, cerium, germanium, maganese, niobium, antimony and tantalum; and x represents the number of oxygen atoms between about 35 and 75 sufficient to satisfy the valence requirements of the other elements. The process consists essentially of five steps. (1) Admixing and slurrying in an aqueous medium compounds of Mo, Co, Fe, Ni, Bi, L and M that are at least partially water-soluble. (2) Adjusting the final pH of the aqueous slurry admixture within the range between 1-5. (3) Concentrating the aqueous slurry admixture by water removal to yield a catalyst coprecipitate. (4) Heating the catalyst coprecipitate at a temperature in the range 200-250° C in the presence of molecular oxygen. (5) Calcining the catalyst in composition at a temperature between 400-600° C in the presence of molecular oxygen.

Photographic

Silver halide photographic emulsions and image forming process. Assigned to Fuji Photo Film Co., Ltd., Minami-ashigara, Japan. Patent Number 4,224,401.

An image forming process has been patented. It comprises, image-wise, exposing to light a photographic light-sensitive material comprising a support having thereon at least one silver halide photographic emulsion layer comprising substantially surface latent image type monodispersed silver bromide or silver iodobromide grains containing up to about 10 mol percent silver iodide, in which the average grain size of the silver halide grains is about 0.7 micron or less and a binder in an amount of about 250 g or less per mol of silver halide, in which the silver halide photographic emulsion layer or at least one other hydrophilic colloid layer on the support contains a compound represented by the general formula

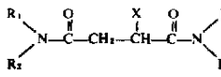
$$R^1NHNHCOR^2$$

in which R^1 represents an aryl group and R^2 represents a hydrogen atom, a phenyl group or an unsubstituted straight or branched chain alkyl group having 1 to 3 carbon atoms, and developing the photographic light-sensitive material with a developing solution containing, as a developing agent, a member selected from the group consisting of (a) dihydroxybenzene, (b) dihydroxybenzene olus aminophenol, (c) dihydroxybenzene plus 3-pyrazolidone and (d) dihydroxybenzene plus aminophenol plus 3-pyrazolidone is present in an amount of about 0.05 mol/liter to about 0.5 mol/liter, and 3-pyrazolidone, is present in an amount of not more than 0.06 mol/liter and the aminophenol is present in an amount of not more than 0.02 mol/liter, and 0.15 mol/liter or more of sulfite ion and having a pH of about 11.0 to about 12.3, in which the amount of the compound of the general formula is 10^{-4} to 10^{-1} mol/mol Ag.

Agricultural

Bis-substituted succinamides and their utility as herbicides. Assigned to Stauffer Chemical Company, Westport, Conn. Patent Number 4,224,053.

A method for controlling the growth of undesirable vegetation has won a patent for Stauffer. It comprises applying to the area, an herbicidally effective amount of a compound

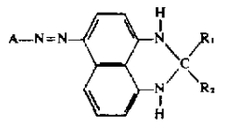


in which X is chlorine or bromine; R_1 and R_3 are each hydrogen, alkyl having from 1 to 8 carbon atoms, inclusive, haloalkyl having from 1 to 6 carbon atoms, inclusive, in which halo is fluorine, bromine and chlorine, alkenyl having from 2 to 6 carbon atoms, inclusive, or alkynyl having from 2 to 8 carbon atoms, inclusive; R_2 and R_4 are each hydrogen, haloalkenyl having from 2 to 6 carbon atoms, inclusive, in which halo is chlorine or bromine, alkoxyalkyl having from 2 to 8 carbon atoms, inclusive, alkynyl having from 2 to 6 carbon atoms, inclusive, cycloalkyl having 3 to 8 atoms, inclusive, cyclopropylmethyl, or benzyl; provided that only one of R_1 or R_2 is hydrogen and only one of R_3 and R_4 is hydrogen.

Dyes

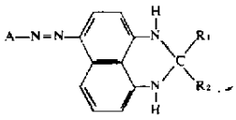
Black dyes for ball-point pen inks. Assigned to American Cyanamid Company, Stamford, Conn. Patent Number 4,224,071.

A dye compound useful in ball-point inks has been patented. It is represented by the formula



in which A is a nitro-substituted carbocyclic aromatic radical selected from the group consisting of 2-nitrophenyl, 4-nitrophenyl, 2-nitronaphthyl, 4-nitronaphthyl, 2-nitroanthryl, and 4-nitroanthryl, R_1 and R_2 are alkyl radicals having a combined total of from 2 to 10 carbon atoms, carbalkoxy substituted alkyl radicals of from 3 to 9 carbon atoms, in which the alkoxy group has 1 to 6 carbon atoms, or together with the carbon, to which they are attached, form a carbocyclic aliphatic ring of from 5 to 8 carbon atoms.

Another claim in the patent is for an ink composition for ball-point pens comprising an effective amount of a dye compound of the previous formula



in which A is a nitro-substituted carbocyclic aromatic radical selected from the group consisting of 2-nitrophenyl, 4-nitrophenyl, 2-nitronaphthyl, R_1 and R_2 are alkyl radicals having a combined total of from 2 to 10 carbon atoms, carbalkoxy substituted alkyl radical of from 3 to 9 carbon atoms wherein the alkoxy group has 1 to 6 carbon atoms, or together with the carbon to which they are attached form a carbocyclic aliphatic ring of from 5 to 8 carbon atoms, dissolved in a vehicle suitable for ball-point pen inks.

Plastics

Polymers for acid thickening. Assigned to Calgon Corporation, Pittsburgh, Pa. Patent Number 4,225,445.

Calgon has patented a method of fracturing a subterranean formation. It involves three steps. In the first, the formation is contacted with an aqueous acid-containing fracturing fluid, the acid being capable of reacting with subterranean carbonate formations, which contains as a thickening agent a branched emulsion polymer of diallyldimethylammonium chloride having a molecular weight of at least 5,000. A member selected from the group consisting of triallylmethylammonium chloride, tetraallylammonium chloride, tetraallylpiperazinium chloride and N,N,N',N'—tetraallyl-N,N'-dimethyl-hexamethylenediammonium chloride is used as the branching agent in the polymerization of the diallyldimethylammonium chloride. The polymer contains from about 95 to 99.99 mole percent of diallyl dimethyl ammonium chloride and from about 0.01 to about 5 mole percent of the branching agent.

Copies of patents are available from the Commissioner of Patent and Trademarks, Washington, DC 20231. Cost is 50¢ per patent. Orders must be made by patent number.