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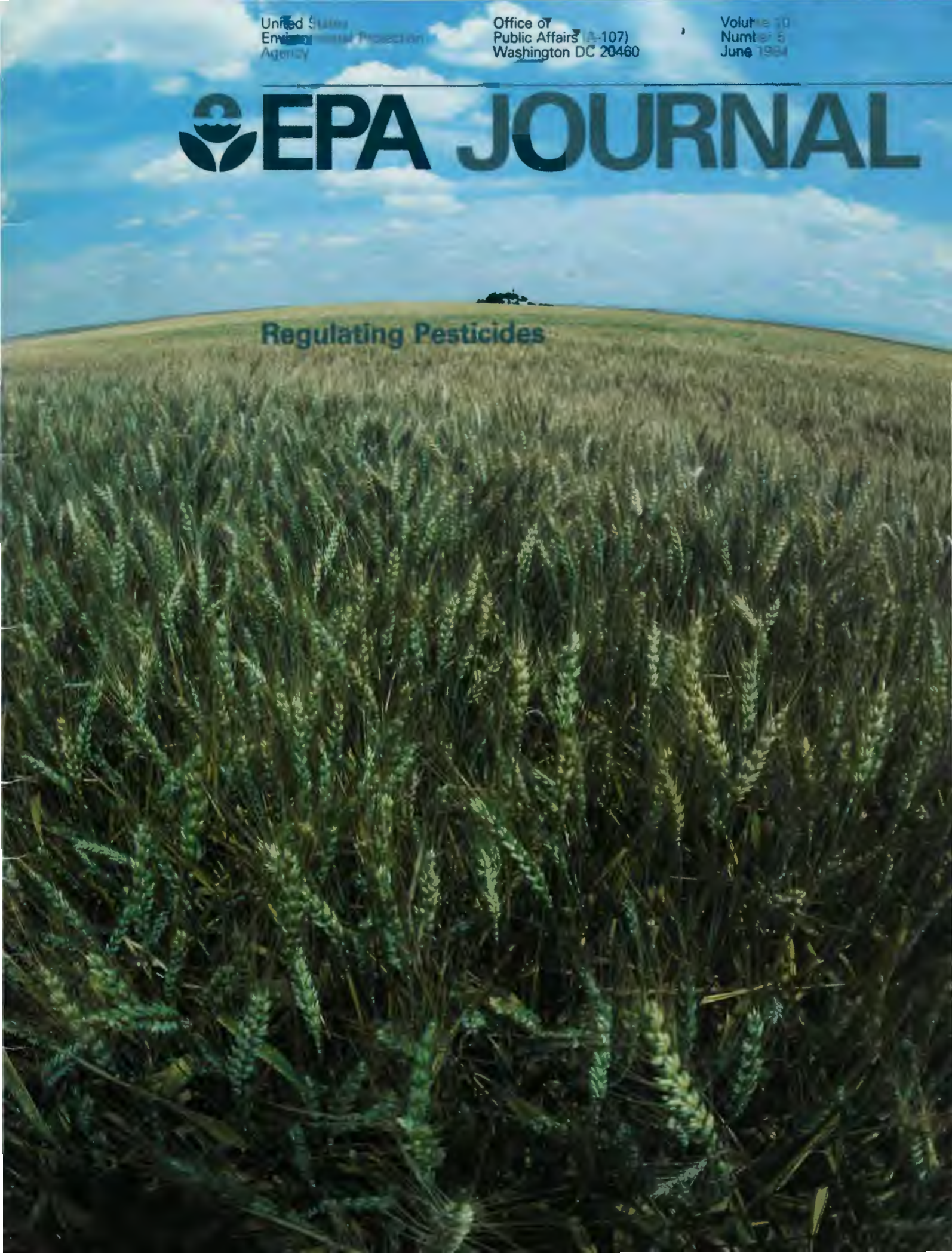

Regulating Pesticides

Regulating Pesticides

How can we control the risks of pesticides, whose job is to destroy insects and weeds? This month's EPA Journal focuses on EPA's role as the country's chief pesticide regulator.

In the issue's lead article, the agency's policies towards pesticide regulation and related issues are discussed by John A. Moore, Assistant Administrator for Pesticides and Toxic Substances. Questions about how the agency carries out its mission in controlling pesticides are answered in an interview with Edwin Johnson, Director of the EPA Office of Pesticide Programs. The exchange of positions between Johnson and Steven Schatzow, Director of the Office of Water Regulations and Standards, is noted.

Writing from another vantage point, Secretary of Agriculture John R. Block considers the most effective way pesticides can be used, including use in Integrated Pest Management, to meet the needs of the country's agriculture.

Changing pace, the issue includes a photo essay of the visit by Administrator William Ruckelshaus to a picnic of agency employees where the first year of his return to EPA was noted. Following this feature are excerpts of a speech to the National Press Club by the Administrator. In the speech, Ruckelshaus presents his perspective on the issue of protecting health and the environment.

EPA Deputy Administrator Alvin L. Alm discusses management today at the agency in excerpts from a recent speech to the national conference of the American Society for Public Administration.

Continuing the focus on pesticides, 13 leaders from around the country who are familiar with these chemicals give their views on the future of this approach to controlling pests.

Articles by the EPA Office of Pesticide Programs explain the responsibilities of pesticide registration, the task of setting limits on pesticide residues and the emerging issue of genetic engineering in pest control. EPA steps to insure safe use of rodent baits are also outlined.

Freshly harvested Iowa corn fills a waiting wagon. Most American farmers rely on pesticides to increase production

Two different viewpoints about the benefits and risks of pesticides are presented in another feature. The authors are Nicholas L. Reding, executive vice president of Monsanto, a chemical manufacturing company, and Dr. Robert Metcalf, a professor of entomology at the University of Illinois.

The feasibility of farming without pesticides or other chemicals is described in an article by a husband and wife who operate a farm in Boone, Iowa.

The recent recommendations regarding EPA by a panel of the National Academy of Public Administration are explained by Howard Messner, EPA Assistant Administrator for Administration and Resources Management, in an interview. An agency follow-up to the panel's proposals, establishment of a new Office of Human Resources Management, is reported.

In other features, new agency developments are summarized in Update, appointments and awards at EPA are announced, and Environmental Almanac notes a change in the environment at Antietam, the Civil War battlefield. □

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EPA is charged by Congress to protect the Nation's land, air and water systems. Under a mandate of national environmental laws, the Agency strives to formulate and implement actions which lead to a compatible balance between human activities and the ability of natural systems to support and nurture life.

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Pesticide Regulation: An Overview
By John Moore 2

EPA and Pesticides: An Interview with Edwin Johnson 4

Keeping American Agriculture Strong
By John R. Block 9

Administrator Ruckelshaus Marks One Year: A Photo Essay 11

Putting the Environmental Issue In Perspective
By William Ruckelshaus 12

Building a Better EPA
By Alvin L. Alm 16

Assessing the Future for Pesticides 20

Registering Pesticides 25

Setting Limits on Pesticide Residues 27

The Benefits and Risks of Pesticides: Two Viewpoints 28

Insuring Safety in Genetic Engineering 32

Farming without Chemicals 33

Safer Use of Rodent Baits 34

Options for EPA—An Interview with Howard Messner 36

Agency Establishes New Human Resources Office 39

Appointments, Awards at EPA 40

Update: New Agency Developments 42

Bluebirds at Antietam 44

Front cover:

A farmhouse is barely visible on the horizon in this sweeping view in Oregon of a field of ripening wheat, one of the many food products treated with pesticides. Photo by David Falconer of Folio.

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Pesticide Regulation: An Overview

By John Moore

As Assistant Administrator for Pesticides and Toxic Substances, I am responsible for the regulation of pesticides used throughout the United States.

The regulation of pesticides at EPA is a difficult task that is sometimes compounded by a general public mistrust of government regulations. It used to be that the government could presume public faith and trust. Unfortunately, that is no longer the case. One need only to go to the newspaper or television to see the words that are often used by the public to describe pesticides. They are "Hazardous," "Toxic," and "Carcinogenic." These words say a great deal about public perception of pesticides. They say that a significant number of people in this country fear the very chemicals that are essential for our agricultural bounty. They convey a lack of trust in the producers of these chemicals, the users of these chemicals, and the government that regulates these chemicals.

I believe that government, and EPA in particular, can regulate pesticides in a sound, consistent fashion that not only will protect the public and the environment but also will convince the public that they are being protected. It is essential that the public understand how the agency reviews and regulates the safety of pesticides. At present, I fear that the public views the regulatory process as a black box whose inner workings are unknowable. We must eliminate this mystery that surrounds risk assessment and management. Ignorance fans the flames of fear: the antidote for this fear is information.

To accomplish this, the agency must clearly articulate the process by which pesticide safety is reviewed and regulatory decisions made, and then must faithfully adhere to that process. During the last few years the process has been in a state of flux, and the uncertainty in the regulatory approach has led to confusion and misapprehension. Twelve years ago, Congress significantly amended the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) — the major statute under which pesticides are regulated. This amendment created a dichotomy between "new" pesticides and "old" pesticides that only now is beginning to be resolved. While "new" pesticides are required to have rigorous laboratory testing to insure safety, numerous "old" pesticides, already in use, have little testing that meets current standards. To rectify this inconsistency, Congress directed EPA to review all of the old pesticides and to apply modern testing requirements. For a number of years the enormity of the task overwhelmed the agency, and implementation of this important directive proceeded sluggishly. Now, however, EPA has in place a process by which timely review of these chemicals is possible and is occurring.

Reviewing old pesticides involves two separate steps — the development of adequate test data and the review and assessment of that data as it is generated. As the initial step, the agency reviewed the available data on old pesticides and identified what important tests to assess health effects had never been performed. EPA then required the

manufacturers of these chemicals to perform the needed studies. The final results of this effort are just now being realized, and EPA expects a tremendous increase beginning next year in the data available for evaluating old pesticides.

The second step, after receiving this data, is to review it carefully and to take appropriate regulatory action. EPA has a process in place to accomplish this step. More importantly EPA has designed the process to focus first on those chemicals likely to pose the greatest risk. Data have been called in and the review process started first on those chemicals that are used on food crops and produced in the largest quantities — in other words, those chemicals to which the greatest number of persons are likely to be exposed. EPA is also looking at new ways to identify quickly any chemical for which adverse health or environmental data are developed, so that these chemicals can be placed at the top of the list for review and action. When adverse effects are recognized, a special review process has been developed to deal with those pesticides in a timely manner.

EPA is not, however, merely reacting to adverse data as they become available but also is actively trying to anticipate problems before they occur. For example, a major national concern is the contamination of drinking water supplies with toxic chemicals. Rather than solely reacting to instances of contamination, EPA is identifying those pesticides that pose the greatest potential for contaminating water so that action can be taken *before* any problem occurs. EPA recently identified 80 some chemicals which might contaminate ground water and is requiring a series of careful tests to see if they really do pose a risk. If so, EPA will act promptly to prevent any problem before it occurs.

As the review of these chemicals progresses, some chemicals that were once thought to be safe will be found to be unacceptable by modern standards. This should not be viewed with alarm, but rather accepted as a positive contribution of modern science. Vast improvements in science, particularly in toxicological testing and analytical chemistry, have greatly increased our ability to assess the risks associated with pesticide use. These improvements permit us to identify previously unknown risks and to take prompt corrective action. We should not lose sight of the fact that even new pesticides, which have been carefully scrutinized by modern science and technology and found to be safe, may at some future date be found unacceptable in light of future scientific advances.

Progress in science demands a constant reexamination of yesterday's decisions. The agency response to this

John A. Moore
Assistant Administrator for Pesticides and Toxic Substances

progress must be an orderly and timely review of pesticides and prompt action whenever unacceptable risks are found. I believe we have the mechanisms in place to accomplish this.

Pesticide regulation is a difficult and complex task. This task, however, is nearly impossible if data on which decisions are based are not sound and accurate. Faulty data supplied by a private laboratory in recent years have raised serious concerns about the integrity of data on which government agencies, including EPA, have relied. These events have also heightened public concern over government regulation. These concerns must be eliminated: the data on which EPA relies must be of impeccable quality.

EPA has recently undertaken a number of steps to insure that this is the case. Last fall, the agency promulgated Good Laboratory Practices that will enhance the quality of laboratory test data required to evaluate the health and environmental effects of chemicals. These regulations establish a standard all laboratories must meet. Moreover, to insure that these standards are met, a vigorous laboratory audit program has been instituted that should insure that compliance with these regulations results in quality data. This audit program is being coordinated with other federal agencies to maximize the supervision of laboratories generating data. Whenever inadequate data are found, the agency will take an aggressive posture towards correcting those deficiencies; it will also prevent any further expansion of the use of these pesticides and will demand prompt replacement of missing data.

I believe EPA is on the right track and moving swiftly forward. I also believe that all of us must continually reexamine where we are and where we are going. There is no doubt in my mind that pesticides are essential to the agricultural productivity of this nation. But at the same time, I believe we need to review our current agricultural practices. We need to ask ourselves whether *all* weeds need to be cleared and whether *all* insects need to be eliminated. A close examination of not only the pesticides used but also the frequency with which they are used could lead to a significant reduction in the amount of pesticides actually used.

EPA has encouraged and supported Integrated Pest Management. For some agricultural commodities successful management has resulted in the best of all worlds — increased food productivity, lower operating costs for farmers, and significant reductions in the amount of pesticides used.

Let me give you an example. In the cotton industry, the boll weevil is a major pest. A number of years ago, cotton farmers were forced to use very large quantities of pesticides to control the weevil. The use of these pesticides destroyed the weevil, but in the process also destroyed a number of natural predators which helped to control other pests that also attacked the cotton plants. Thus, the farmer was forced to use additional pesticides to control these other pests. The use of Integrated Pest Management practices has, however, radically reduced the need for repeated pesticide application. Today the cotton farmer can use a type of biochemical pesticide known as a juvenile hormone that interrupts the reproductive cycle of the boll weevil. Because the compound is designed to affect only the weevil, its use provides significant control without adversely affecting other organisms that are beneficial to cotton production. The end result for the farmer is better insect control with far less use of pesticides.

The Integrated Pest Management philosophy continues to spread across the country, and I look forward to a time when IPM technology exists for all major commodities. We also need to strengthen other approaches to pest control such as plant genetics and to be prepared to capitalize on powerful new biotechnology techniques. Just as modern science reveals risks not previously identified, modern science can and does provide new solutions to old problems.

I believe that government, in cooperation with producers, farmers, and consumers, can make significant strides in improving our use of pesticides. These advances will not come overnight — they will demand a commitment to a long and arduous process. But I believe that in the long run society as a whole will greatly benefit. □

EPA and Pesticides:

An Interview with Edwin Johnson

In the following interview, Edwin Johnson, the Director of EPA's Office of Pesticide Programs, spells out how the agency regulates pesticides and explains EPA's present concerns and priorities regarding these chemicals. (Since this interview, Johnson has been named Director of the EPA Office of Water Regulations and Standards, and Steve Schatzow, who has headed that office, has been named Director of the Office of Pesticide Programs. *See story on p.7.)*

Q What is EPA's role in the pesticide field?

A First and foremost, EPA's role is to control each pesticide product marketed in the United States. No product can be sold without EPA's approval. We have a pre-market clearance process which requires that manufacturers submit a substantial amount of health and safety data before approval is granted.

EPA attempts to provide an objective view in balancing risks and benefits of pesticide use as required by law. We are neither pro-industry nor anti-chemical. One of the reasons pesticide decisions can be so controversial is that we are often in what Russ Train called "the embattled middle," making tough calls on where the line should be drawn between where benefits begin to outweigh risks and vice-versa. It's not a quiet spot, but it's challenging and important to virtually every American, since everyone uses pesticides or is exposed to pesticides in their daily lives.

Q Both industry and environmentalists have criticized the pesticide reregistration process. Are you planning to make any changes in it?

A I understand both concerns: industry wants the chemicals they produce to be cleared of any safety questions while environmentalists want assurance that pesticides will not harm people or upset nature's balance. The systematic approach to reregistering the approximately 600 old pesticide chemicals is progressing, and by the end of the 1984 fiscal year, the Agency will have reviewed 90 old chemicals. At present, the pace of reregistration is a function of resources rather than the process itself.

It is important to note that the 90 chemicals which will have been reviewed by the end of this year reflect close to 50% of the total pesticide usage in the United States. Our reregistration effort is designed to focus first on high volume production and food use chemicals to which exposure is greatest. Also, I emphasize that people often overlook the fact that one of the initial steps in the reregistration process was to identify chemicals with known potential health effects and to then examine their risks and benefits. As a result, many of these proven "bad actors" have been removed from the market or restricted in ways to reduce risks.

There are some steps we are taking to accelerate related programs which will ultimately facilitate our review and reregistration of old chemicals. For example, the "data call-in" program which requires submission of missing chronic health effects data will be accelerated so key chronic studies are available as soon as possible. The agency is also taking steps to see that the industry complies with FIFRA provisions which require them to inform EPA of any adverse health effects data that may arise from new testing. These pesticides are then dealt with on a priority basis.

Finally, because of the public scrutiny and concern about the pace of reregistration, the Administrator has asked the recently formed Pesticide Advisory Committee to look at options for improving the process. We will be sharing our own thoughts on this issue with them shortly.

Q What is your response to the charge some have made that 80-90 percent of pesticides now in use haven't been adequately tested for health effects, especially long-term chronic effects such as cancer?

A There is some validity to this criticism since many pesticides were registered years ago when data requirements focused primarily on acute health effects and efficacy. Under current registration requirements, new chemicals must be tested for a wide range of chronic health effects as well as environmental fate and wildlife impacts. There is no doubt that old chemicals need to be similarly scrutinized, and to this end we are requiring additional testing to upgrade our knowledge.

The agency has already required submission of missing chronic health-effects data for about 167 chemicals. Unfortunately, the type of data we need can't be generated in a matter of weeks or months. For example, laboratory studies to assess cancer effects typically take four years to complete.

The agency has already received a number of chronic studies generated as a result of the data call-in program. However, next year, we expect to receive literally hundreds of studies assessing cancer, reproductive effects and the like. Review of these studies is and will be a top priority of the pesticide program.

Q How many pesticides need to be reviewed and reregistered to insure that they are acceptable from a health and safety standpoint?

A The agency has identified just under 600 basic chemicals used to manufacture the over 45,000 to 50,000 currently registered pesticide products. Data on each chemical will be reviewed to determine the terms and conditions under which products containing that chemical can be reregistered.

Q How long will reregistration take?

A According to present plans, we anticipate reviewing 25 chemicals per year. At this pace, reregistration will be

completed around the year 2000. However, let me re-emphasize that high-exposure and food-use chemicals are top priority and are being reviewed first rather than last. Also, reregistration is a dynamic process, and we are continually looking for ways to speed up the process.

Obviously, we do not have an unlimited budget nor unlimited staff resources. However, as described elsewhere in The EPA Journal, we are targeting our resources to make sure that the agency is looking at the chemicals that count in the next few years. We may find that many of the chemicals destined for reregistration review in the later years of the program will drop by the wayside, or will result in so little exposure that large volumes of data are not needed to answer health and safety questions.

Q Is EPA encouraging alternatives to toxic pesticides which are less hazardous to man?

A Certainly. We have recently published guidelines and are about to put final regulations into place governing the so-called "biorational" pesticides — biologicals and chemicals which mimic naturally occurring chemicals. We believe that clarifying the data requirements will serve to stimulate innovation in this field.

In addition, we give priority to reviewing pesticides which are intended to be replacements for pesticides which EPA has taken or is taking off the market because of potential health problems.

We are also conscious of the potential problem of introducing a "new chemical bias" in the system. Some people worry that we may be discouraging the introduction of new products because we demand such high standards of a new product coming on the market. In actuality, we require the same data for new products and old products. We have a few years to go before these requirements are uniformly imposed on the old products, but the same standards will apply to new and old alike.

Q Will toxic pesticides always be needed or is it possible that alternative approaches will mostly take their place?

A Pesticides will be needed in the foreseeable future. However, the degree of toxicity of the pesticides on the market will hopefully change for the better. The trend is to develop pesticides which are more selective in controlling the target pest, and are required in smaller quantities. Pesticides will obviously have a place in pest control systems in modern agriculture — BUT our objective should be to use pesticides judiciously and in combination with other methods in an integrated approach to control pests in the most cost effective way and at the smallest risk to the environment as possible.

Q How can people participate in the decision-making process on pesticides?

A First, EPA publishes for public comment our concerns about individual pesticide chemicals through the special review process. These are the pesticides which we believe may be posing an unreasonable risk to society because of their potential to harm people or wildlife. As such, they tend to be the most controversial pesticides, and those for

which public input is most actively needed. We have also recently begun to publish for comment proposed actions for pesticides for which we have had a difficult time in making decisions. For instance, when we have conflicting data on which to base a risk assessment, we must carefully weigh all the information before us; we are trying to do a better job of explaining that thought process to the public, and offering more opportunity to have other views presented.

The focus of the debate on public access to pesticide decisions has been on the data submitted to EPA by the registrants. Our position has been strongly in favor of making such health and safety data available to the public. In 1978, Congress amended the pesticide law, at the request of the Administration, to make it clear that such data should indeed be publicly accessible. Unfortunately, we have been tied up in the courts by the industry ever since those amendments were passed. We are now pursuing the matter in the Supreme Court. I believe that making these data available to the public is critical to maintaining the credibility of EPA's decisions.

The public should also interact with the Congress on their views on how pesticides should be regulated. Congress provides the broad direction to the Agency on pesticide matters, and we try very much to stay in tune with our Congressional directions in making decisions, big and small.

Q Are the dangers from pesticides being exaggerated in the public's concern?

A The public in many cases wants assurances of safety. We can't give that. Because pesticides are by their very nature designed to be biologically active and kill pests and weeds, we speak in terms of relative risks, rather than "safety." Much of the debate about pesticides centers on this issue. To the extent that some people focus on the risks only, and are not cognizant of the benefits side of the equation, the risks can be overexaggerated.

We do risk assessments to help us separate big problems from small problems and often need to make assumptions or assess "worse-case" scenarios to make up for gaps and uncertainty in our knowledge. These crude estimates are often taken and used in the same way as actuarial statistics based on observed events rather than worst-case indicators or upper-bound estimates of risk.

It's difficult to convey that these risk estimates are not absolute predictors of what will happen in the real world, but rather help regulators sort out what chemicals are riskier than others. The risk numbers take on a life of their own, and even though they may look pretty scary, they aren't always real. EPA probably does contribute to the confusion in its presentation of quantitative risk estimates. We need to do a better job explaining our risk assessment processes, and what these numbers do and do not mean.

Q Do the tolerance levels EPA sets also apply to imported foods?

A Yes, absolutely. We are just as interested in protecting U.S. consumers from pesticide residues on imported foods as those on domestically produced commodities, and we apply the same legal standard. The Food and Drug Administration (FDA) monitors imported food and feed to ensure that they do not exceed tolerance levels established in this country.

Q What does EPA do about the so-called "circle of poison" where American consumers allegedly are exposed through imported foods to residues of pesticides which have been banned in this country due to health hazards?

A EPA has instituted a tolerance revocation policy which calls for revoking tolerances for the many pesticide uses we have banned. This policy will serve to break the "circle of poison" and protect Americans from exposure to pesticides whose use has been banned in this country. For banned pesticides which may persist in the environment even after the use stops, FDA will use "action levels" which can be easily adjusted in place of the revoked tolerances to protect American consumers. The agency is now analyzing data on current residue levels of several cancelled pesticides in various food and feed crops, and will publish these actions soon. In the future, EPA will conduct cancellation and tolerance revocation proceedings simultaneously, as we have with EDB.

In addition, under the provisions of section 17 of FIFRA, EPA shares information with foreign governments and purchasers concerning pesticides that are unregistered in the United States. Foreign purchasers must sign acknowledgment statements when purchasing U.S.-produced pesticide products that are not registered for use in the United States (under section 17a). EPA must also notify all governments world-wide of U.S.pesticide registrations, cancellations and suspensions (under section 17b).

In my experience, other countries are very concerned about their public, international image and reputation, and want to maintain their credibility as exporters. EPA is actively involved through the United Nations Food and Agriculture Association (FAO) in assisting other countries as they establish systems to better regulate pesticides and agricultural exports and work closely with individual countries as problems arise.

Q Does EPA have any special requirements for identifying and controlling pesticides which may present a ground-water hazard?

A Yes, EPA has set forth the data requirements required to support registrations of outdoor use pesticide products in a final rule scheduled to be published this summer, although the requirement is already in effect. During pesticide registration, EPA routinely assesses the ground-water contamination potential of each outdoor use pesticide. This assessment is based on laboratory and field studies on the environmental fate of the chemical in combination with the field characteristics of the proposed use area and the use directions. If our review of these data shows environmental persistence and leachability of pesticide residues and that shallow unconfined aquifers likely exist in the proposed use area, then additional field testing is required of the registrant. If on the basis of both laboratory and field monitoring data it appears that ground-water contamination is likely, EPA looks at ways to control use of the pesticide and may deny the proposed use if that's the only way to prevent problems. OPP is applying this policy retroactively to old chemicals as we move to make reregistration decisions on all existing pesticide products and has accelerated calling-in missing environmental fate data on some 40 chemicals which may be leachers.

Q After the EDB experience, can EPA assure consumers that the foods they purchase are not contaminated with hazardous levels of pesticides?

A Although EPA cannot provide blanket, pat assurances that all food commodities in the channels of commerce are free of hazardous pesticide residues, the system has provided a high degree of practical safety to food consumers over the years. And through the review of existing

Pesticides, Water Rules Directors Exchanged at EPA

EPA Administrator William D. Ruckelshaus recently announced that Steven Schatzow will be the new Director of the Office of Pesticide Programs. Schatzow, now Director of the Office of Water Regulations and Standards, will exchange positions with Edwin L. Johnson, who has been director of the pesticides program office.

Ruckelshaus described the step as the first executive exchange in an agencywide management program at EPA. "These two executives have been chosen for the initial exchange because of their long experience with EPA and their comprehensive knowledge of agency programs and policies," he said.

"This shift in responsibilities follows recent recommendations of a panel of the National Academy of Public Administration," Ruckelshaus said, "to reassign our top managers in critical areas as a means of infusing new blood and ideas across program lines."

Ruckelshaus noted that "Ed Johnson has had a distinguished 26-year career in the federal government, and his accomplishments in pesticide regulation over the past nine years have been recognized nationally and internationally." He added that Johnson is "renowned in international circles" as a pesticide regulatory expert and has worked with the World Health Organization, the Food and Agriculture Organization, and assisted many developing countries in setting up pesticide regulatory processes. Although assuming new duties, Johnson will continue for the next year or more to represent EPA in international pesticide activities," Ruckelshaus said.

"Steve Schatzow's work has also been exemplary," the Administrator pointed out. "Over his nine years in EPA he has become recognized, both inside and outside the agency, as one of the nation's foremost experts on the legislative aspects and the implementation of the Clean Water Act." Ruckelshaus said that under Schatzow's leadership, the Office of Water Regulations and Standards has proposed six effluent guidelines for water discharges and promulgated 22 more, and that "because of their technical integrity these guidelines have withstood challenges by industry and environmental groups."

chemicals, we are building a more complete data base and examining it closely in order to uncover remaining pesticide health and safety problems. However, even in the future, we may find new problems as the dynamic processes of science, technology, risk assessment and risk/benefit decision-making evolve. When food residue problems occasionally arise, EPA and FDA will continue to address them as quickly and responsively as possible.

But the public may rest assured that pesticide residues in the food supply are well covered by the tolerance system. According to Market Basket Surveys and Surveillance conducted by FDA, the tolerance system is, for the most part, working effectively to protect the American consumer from undue exposure to pesticide residues through the food supply.

Q When did pesticides come into general use and why is their use increasing?

A Though a small number of chemicals were used to control pests beginning in the late 1800s, most pesticide chemicals in use today were not developed until after World War II, when chemical research proliferated. Use of chemicals in agriculture has steadily increased since then. Modern farming techniques, including increased automation and new cultivation practices, have evolved to accommodate pesticide use as an integral part of agriculture. Large-scale farming operations and monoculture, among other things, now also result in pest infestations sweeping broad areas, up to thousands of acres. Farmers find that pesticides are a very effective way to deal with these problems; also they feel that pesticides are the most economical and efficient way to keep crop yields up.

Herbicide use in particular has increased because it reduces labor costs. Also, although increased pesticide usage may increase risk it can provide benefits; herbicide use, for example, also reduces problems such as sediment runoff, which has in the past been a serious cause of water pollution. Such risk/benefit trade-offs are commonly faced by pesticide regulators.

I want to make one more point. Though usage of many different pesticides has increased, it is important to note that application rates have actually decreased. This is because researchers have developed pesticides which are much more selective to control only the target pest and are effective in small amounts.

Q Was it known from the beginning that they could present problems to people and wildlife?

A When pesticides came into general use in the late 1940s, farmers were understandably impressed with their ability to control long-standing pest problems and thus increase crop yields substantially. They were thought to be panaceas, since they did the job and

were not acutely toxic to applicators. Unfortunately, the state-of-the-art in science was still too unsophisticated to predict chemicals' long-term impact on the environment or human health. The turning point came in the late 1960s when Rachel Carson's *Silent Spring* increased scientists' and regulators' realization that use of pesticide chemicals might have broad health and environmental effects. Since then, technology has advanced to the point where chemicals can be detected in environmental media down to parts per billion and, in some cases, parts per trillion. Current data requirements for pesticide registration reflect advancing technology and should permit us to mitigate environmental damage and potential human health effects.

Q What are some of the side effects of pesticide use?

A People shouldn't assume that *all* pesticides have side effects; many are indeed relatively risk-free if they are used properly. On the other hand, many pesticides are toxic, with effects such as acute poisoning symptoms and organ dysfunction in humans and harm to fish and wildlife populations. Some pesticides produce chronic health effects in laboratory animals, but generally pesticide applicators and consumers are only exposed to levels which are well below those that caused the adverse effects in the laboratory. Also, acutely toxic pesticides are usually restricted to use only by certified pesticide applicators or people under their supervision, so the general public's exposure is limited.

Q How risky are pesticides to the general consumer compared to the applicator?

A Generally, the people in our society who are most highly exposed to pesticides are applicators, be they private, home users, or commercial. The general consumer usually is exposed to pesticides primarily through the food he or she consumes, which is covered by the tolerance system discussed elsewhere.

Although applicators are exposed to the highest levels of pesticides, they too are protected in several ways. Because their exposure is not involuntary or inadvertent, they have available to them the use instructions and precautions on pesticide product labels, which are designed to ensure the safest possible use of pesticide products. In addition, home users are protected by the fact that the pesticide formulations available to them are generally far less potent and therefore less toxic than formulations available to commercial applicators.

Q Is wildlife more vulnerable than humans to pesticides?

A In some cases, yes; but certainly not across the board. It depends on the characteristics of the pesticide and on the sensitivities of the particular species.

Q How big a difference is there between the theoretical risk of a pesticide extrapolated from tests on laboratory animals and the actual risk?

A The theoretical risks generally overstate the case; that is, they indicate artificially high risk levels. Actual risks are much more likely to be lower because of the many assumptions that must be made in quantitative risk assessment. Furthermore, people are not usually exposed to high levels of only a single pesticide, as are laboratory animals in feeding studies. In real life, people are exposed to many competing risks from events which override the effect of pesticides. From a practical standpoint, sorting out and evaluating these risks and effects is difficult, if not impossible. Therefore, EPA as a regulatory agency must depend on theoretical assessments of risk in making pesticide decisions, but we should always remember that these are indicators of *relative* risk and not absolute predictors of risk in the same sense as actuarial tables.

Q Do you make choices about how much risk is acceptable in pesticide use?

A Yes. That's the main responsibility of the job. The acceptability of the risk depends, of course, on the amount of the benefit to be received for taking the risk. Not even a low risk is acceptable if there are no benefits. For a pesticide with tremendous benefits to agriculture or vector control, acceptance of a higher risk is more reasonable.

It's obviously one of the most difficult parts of regulating pesticides. While we are assisted by quantitative risk analyses and extensive benefits analysis, it all comes down to a subjective judgment as to when the benefits outweigh the risks. Value judgments can't be reduced to simple formulas or legislated. We also wrestle with equity questions, since the people taking the risks aren't always those who are reaping the largest benefits. This is why pesticide decisions are difficult to make and are perceived simultaneously as good and bad by the many different interests in the field, based on the same set of facts.

Q Are the benefits from a pesticide taken into account when you examine its risks?

A Risk *assessment* deals only with the potential risks a product may pose to human or wildlife health; this does not include consideration of benefits. Risk *management* — what you decide to do about a risk from a regulatory standpoint — takes all other factors into consideration, such as the benefits of the chemical to society, and the alternatives for reducing risk.

Q Is there anything you would like to say in closing?

A I want to encourage a reasonable dialog about pesticide use in this country. The Administrator's new Pesticide Advisory Committee, which represents interests from a wide divergence of views in society, is a good step in that direction. We need to reduce the rhetoric and increase the logic. We as a society should consider pesticide risks in the overall context of the risks we all take every day. At the same time, the agency must increase its credibility, which Bill Ruckelshaus and Jack Moore have already taken major steps to accomplish. And I would say to industry that it needs to live up to its words about product stewardship through its dealings with developing countries, its attitude toward providing information to the public, and its approach to the regulatory system. For example, don't solicit the submission of emergency exemptions or special need registrations just to get on the market earlier, since it only makes the job of the agency and the states harder, and generates mistrust. Finally, all of us must be willing to talk to each other, understand if not accept others' points of views, and approach the difficult issues in pesticide regulation with candor and maturity. □

Keeping American Agriculture Strong

By John R. Block
Secretary of Agriculture

The statistics on American agriculture and its impact on the nation's economy are staggering.

Although our farm operation workforce is 3 million strong, approximately 22 million people work today in some phase of agriculture. The majority are involved in storing, transporting, processing and merchandising the output of our farms. Twenty percent of the jobs in America's private sector are related to agriculture.

Agriculture not only keeps our stomachs full; it is essential to the well-being of our nation. Although all aspects of the system are critical, most people consider the farming operation to be "real agriculture."

Whatever your perspective—economic or nutritional—there's a lot at stake in our annual agricultural production. Consumers spent $298 billion for U.S. farm-produced foods last year; $214 billion of that went for between-farm-and-table-costs. What Americans ate had a farm gate value of $84 billion. Our combined crops and livestock production valued approximately $120 billion.

In this high stakes game, the odds aren't always favorable. Unfavorable weather can be devastating. Late or early frosts, too little or too much rain (at just the wrong time), hail, blizzards, or extremely hot or cold temperatures can wipe out fruits, vegetables, field crops or livestock. It used to be said that we can't do anything about the weather. We still can't control it, but we can do something about how it relates to agriculture. Through agricultural research, we now raise plant varieties which are acclimated to the norms and resistant to the extremes of weather stress. We've improved agricultural weather forecasting and information dissemination systems so farmers can take protective measures against some weather phenomena. A great deal of our livestock and poultry production utilizes controlled environment housing. We are making real progress in adapting to factors we can't control.

Another potential threat to agricultural production is now partially controlled. Pests destroy approximately 30 percent of annual production potential before farmers can bring their crops to harvest or livestock to slaughter. Weeds compete with crops for water, nutrients and light. Poisonous plants can debilitate or kill stock on grazing lands. Insects weaken or destroy crop plants and cause livestock to convert feed to meat inefficiently. Pathogenic fungi, bacteria and viruses can spoil crops in the field and bring on diseases in farm animals. Nematodes can attack plants and animals. Vertebrate pests including birds and rodents can wreak havoc on crops nearing maturity. Predators can reduce lamb and calf crops significantly.

Approximately $35 billion will be lost to pests during the 1984 growing season. In addition, growers will spend about $15 billion to prevent further damage. In some crops, more time and non-capital expense is allocated to pest control than to any other production element. Success that farmers have in holding pest losses down is a testimony to the success of research and educational programs conducted by the U.S. Department of Agriculture (USDA) and the Land Grant university system.

In an undisturbed environment we would expect to see a balance of plant and animal populations that fluctuated dramatically because of climatic or other forces. An agroecosystem is not an undisturbed environment, and we cannot afford dramatic fluctuations in the plant and animal populations essential to our sustenance. We must take decisive measures to insure that the portion of our agricultural production which is lost to pests remains within acceptable limits.

A program which is focused on pest control within the agroecosystem is Integrated Pest Managment (IPM). This concept is a systems approach to applying current technology to contain losses caused by pests and reduce the costs of this containment. Ongoing research programs help us understand the biological properties of the agroecosystem, and experience and prediction allow us to develop economic models based on costs of inputs and expected results. The social aspects of technological implementation comprise another parameter of the system we call IPM. When the biological, economic and sociological implications of the system have been fully assessed, technologies can be applied to help reduce costs attributable to these pests.

The use of crop varieties resistant to diseases or insects, or so competitive with weeds that the weeds can't choke them out is one technology now in use. Along the same line, some livestock breeds can tolerate certain insects better that others; so they are selected for areas where those pests are a problem. Biological control of pests is frequently a part of IPM programs. There are good examples of the importation of beneficial insects or disease agents to attack weeds or pest insects. Additionally, some program elements stress conservation of native beneficial organisms. A variety of cultural practices are part of IPM programs. Crop rotation, used for generations by farmers, is now integrated with practices like conservation tillage, multiple cropping and highly specialized timing of planting, harvesting and other operations to prevent escalation of pest damage and pest control costs. Studies indicate that use of conservation tillage on amenable areas rather than reliance on moldboard plowing can give adequate crop production and save $4 billion in annual tractor fuel costs.

Pesticides remain an integral part of nearly all IPM programs. Although many IPM programs have resulted in a dramatic decrease in pesticide use, a few programs have demonstrated that increasing pesticide use can be justified. IPM programs assure that pesticides are chosen on the basis of their impact in the agroecosystem, not just on the basis of their cost. Mechanisms in IPM programs insure that the timing of pesticide application is optimal for control of the target pest and for minimal adverse effect on the rest of the agroecosystem. Programs in pesticide education insure that pesticide applicators are properly and adequately trained in application technology. The National Agricultural Pesticide Impact Assessment program insures that pesticides necessary for agricultural production are available. All these programs combine to assure that pesticides are used effectively and judiciously.

Pesticides and other pest management chemicals used today are markedly different from those in use during the tremendous growth in agrichemical technology following World War II. They are actually quite different from those in use 12 years ago when the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) was amended. Modern pest control chemicals include some which are synthetic mimics of natural insecticides like pyrethrum. Progress in herbicide technology includes development of products which are effective at very low rates of application and are specifically toxic only to certain weeds.

Some of the most exciting pest-related chemistry includes products which are not toxic, but are detrimental to the functioning of pest population components within an agroecosystem. These include the insect pheromones. Pheromones are produced by insects to enable a form of communication. The most widely recognized insect pheromones are those used by one sex to enable the opposite sex to locate them at mating time. We can identify and synthesize some of these chemicals for successful use in programs which disrupt the mating process or allow precise surveys of population densities, locations, and stages of development.

Pest scouting is an important component of many IPM programs. Scouting refers to inspection of growing crops to determine pest population levels. Our strong research base enables us to develop specific scouting methods, thereby predicting crop loss that will result from detected pest levels. In 1982 professional scouts inspected 41 percent of our cotton acreage. Nearly 20 percent of the grain sorghum and peanut acreage was scouted by professionals and most field crop acreage had significant portions scouted by either professionals, farmers, family members or farm employees. Knowledge of pest population levels, a direct result of pest scouting, is an integral part of the systems approach for IPM.

Successful agricultural production is dependent on our ability to implement technologies which have been rigorously assessed by trained scientists. Pest control chemicals and devices, either used or recommended by USDA agencies, are not only tested for effectiveness, but meet the stringent requirements of FIFRA. The research and education agencies in our public science establishment work in concert with its regulatory arms to provide assessments of risk made in the total public interest. This assures that the technology necessary to maintain strong agricultural production is available to farmers.

What are our prospects for the 1984 crops? The Economic Research Service of USDA currently predicts a possible 11 to 17 percent rise in field crop acreage. Because farmers cut back on inputs in 1983, there will be an increase of 15 to 20 percent in outlays for pesticides, fertilizers, farm machinery purchases and repairs, and energy at an approximate cost of $40 billion.

Because of the implementation of practices like IPM, conservation tillage, multiple cropping and integrated agroecosystem management, the result of the 1984 crop and livestock production year will demonstrate that American agriculture can contend with a multiplicity of issues. These issues include continuing to produce high quality food and fiber without unduly increasing costs to consumers, containing losses to pests at an acceptable level, maintaining the best possible environmental quality and assuring that our productivity base remains strong. □

Administrator Ruckelshaus Marks One Year

EPA Administrator William D. Ruckelshaus stands by the Washington Channel of the Potomac River and talks to outdoor gathering of agency employees.

One year after his official swearing-in on May 18, 1983, EPA Administrator William D. Ruckelshaus spoke to hundreds of EPA employees gathered on a windy but sunny day at the Washington Channel Waterfront Plaza for an informal picnic. Ruckelshaus began by alluding to "the cloudy skies" - both figurative and literal - that plagued EPA when he arrived a year ago and that kept his welcoming rally at that time confined to the indoor shopping mall in EPA headquarters. He credited EPA's career employees with enabling him and his new management team to turn the image of the Agency around during the past year. "You are the finest group of public servants I've ever come in contact with," the Administrator said. Without this high degree of dedication from employees, the Administrator said he would have fallen short of his goal: "the restoration of trust in EPA....If people in this country don't believe that what is being done at EPA is being done competently and honestly then trust is destroyed." □

Ruckelshaus walks through crowd to shake hands and chat with EPA employees

EPA employees turn the steps of the Waterfront Plaza into a mini-amphitheater for the Administrator's speech.

Putting the Environmental Issue in Perspective

By William D. Ruckelshaus

In a speech May 22 to the National Press Club in Washington, D.C., the Administrator of EPA, William D. Ruckelshaus, spoke about what he called, "Plateau of Hope: Some Perspectives on Environmental Achievement." Here are excerpts of his comments:

"One thing we could do with more of in Washington is perspective. An understanding that there is in national government a continuing movement towards reaching some important national goals, and that such progress takes place in a time period somewhat longer than the ordinary purview of the six o'clock news, is difficult for many people to grasp. It's even difficult for people running the government to grasp; I recall that the average tenure of cabinet officers over the last few years has been something like eighteen months, just enough time for a reorganization and a long-range planning seminar.

"So I consider myself uniquely fortunate to have become a recidivist in my present job, and to have been given some of that rare perspective in connection with our nation's efforts to protect the environment. Today I'd like to share some of that perspective with you, because in my opinion it's nearly impossible to understand our current environmental situation or to form an intelligent view of what we still must accomplish without a good understanding of where we've been.

"When I first spoke to the National Press Club a little over thirteen years ago I had about five weeks' experience as head of the newly created Environmental Protection Agency. Putting the agency together and responding to the cries for instant cleanup — it was a job I compared to running a 100-yard dash while taking your own appendix out. The speech I gave was titled: 'The Environmental Crisis—Our Work Has Just Begun.' The subtitle was certainly a reasonable assertion under the circumstances, and the use of the word 'crisis' was for once entirely appropriate, as a reference to the circumstances that led to the formation of the Environmental Protection Agency and the protective legislation of the Seventies.

"Here's one man's perspective. In 1970, air pollution was obvious and pervasive and immediately threatening to public health in many places. In fact, one of the first things EPA did as an agency was to get a court order shutting down the factories of Birmingham, Alabama, to avert a threatened health disaster. In 1970, sixty million people were on sewage systems that discharged raw sewage—two million tons a year of organic wastes—into surface waters. In that year industry discharged two million tons of organic wastes, around a quarter of a million tons of toxic heavy metals, and tens of thousands of tons of other toxic chemicals into the same waters. Again, pollution was pervasive and obvious. No one can forget the Cuyahoga River in Ohio bursting into flames. Many responsible scientists were predicting the death of Lake Erie. In Pensacola Bay, they used to report fish kills in square miles of dead fish. Vast areas of the Atlantic Coast and the Great Lakes shoreline had been closed to swimming and fishing.

"In 1970, despite the warnings, we used over 30 million pounds of DDT; DDT residues in human tissue were up to eight parts per million and the bald eagle and other birds of prey were headed for extinction in America as the pesticide destroyed their eggs. Wetlands continued to vanish to the developer; Florida alone lost 169,000 acres and California lost nearly 50,000 acres in the decades between 1950 and 1970.

"That was the nature of the crisis then; perhaps the most troubling thing about it to the public was the sense that nothing significant was being done to correct these grave problems. Although there were strong state programs in some places, many doubted that states could ever cope with their industrial citizens without a powerful national instrument for environmental protection.

"It is thus remarkable in retrospect that almost all of that first speech in 1971 was a *defense* of the environmental ethic. This is another point of perspective: the immense mental distance we all have come in our attitudes toward the

The sun bursts through dark clouds over Richmond Harbor, California

environment. To any present day audience this side of Taiwan that speech would be preaching to the choir. This change in attitude is in one sense a tribute to the work of the Environmental Protection Agency since that time. We demonstrated that the ideals of Earth Day, which many in 1971 considered a vaporous fad, could be made to work, could be forged into effective instruments of national policy.

"As a result, few would now deny that the kinds of problems that led to the formation of the new agency in 1971 are largely under control. Between 1970 and 1981, although we added 30 million people to our population and increased the GNP by almost 36 percent, estimated particulates emissions declined by 53 percent, sulfur oxides declined by 21 percent and carbon monoxide declined by 20 percent. Lead levels decreased nationally 64 percent between 1975 and 1982, as the use of leaded gas declined. The trends for ambient levels of almost all important air pollutants in almost all cities have also been steadily declining. A decade ago, for example, Portland, Oregon, could expect to have a hundred or so days when the CO count was in excess of the ambient standard. Currently it's more like two or three days.

"We have provided municipal sewage treatment for over 80 million Americans since 1970. Most industries have installed water pollution control technology, and as a result, organic waste discharges from industry have been reduced by 38 percent. When the controls mandated by our recent effluent guidelines are in place, discharges of toxic pollutants will have been reduced by 96 percent from 1972 levels. Nor should we forget that attention directed toward the environmental impact of development by the National Environmental Policy Act has cut down radically on potential assaults on the environment. That people *now must think about such impacts* means that many projects that would have come into existence ten years ago, and which would be damaging our environment now, never left the drawing boards.

"And the environment has responded. There is fishing and water recreation again on many major rivers that people thought were lost forever. Over 99 percent of the streams nationwide are designated for uses equal to the 'fishable-swimmable' goal mandated by Congress in the Clean Water Act. We've improved water quality on 47,000 miles of streams since 1972. Lake Erie did not die. There are fish in the Trinity River at Dallas, once written off as a sewer. Over 22,000 acres on the New Jersey shore have been re-opened for shellfishing. As I came in from National Airport Sunday I was struck by the number of fishermen on the Potomac. Ten years ago the millions of gallons a day of raw sewage that flowed from the Key Bridge outfall would have rendered such activity foolhardy. I suppose the most symbolic achievement of all has been the return of

the bald eagle; we have convincing scientific evidence that endangered populations of our national bird have come back much more quickly than had been expected, and that this resurgence is strongly correlated with the ban on DDT.

"We could go on and on like this, but what I wanted to do was to demonstrate that given reasonable goals we can make reasonable progress against them. The major sources of air and water pollution we identified in 1971 are under control. Note that this does not mean that they are gone. Control of industrial and mobile sources of air pollution and water pollution from manufacturing and sewage are still the subject of perhaps the bulk of EPA's ordinary activity, but they no longer enter the popular consciousness as overwhelming problems.

"Imagine how different life would be if we had not acted when we did. Imagine that we were driving today's vehicle miles—that's 24 percent more driving—in cars with the emissions characteristics of 1970 cars. (Never mind that we could never afford the gas bill.) A 1984 car emits 95 percent less carbon monoxide and hydrocarbons and 76 percent less nitrogen oxides than a 1970 gas-guzzler. Imagine the smog and the sickness and the public outcry if they didn't. Although a lot of our environmental achievement is attributable to the switch from coal to oil, we're starting to use more coal again. If we had not put controls on sulfur and particulates in place when we did, and reduced, for example, sulfur emissions from a projected 41 million to 27 million tons per year nationwide, we might today be faced not only with an acid rain controversy but with a grim choice between health and energy.

"I don't mention these achievements to pat EPA on the head, nor do I wish to suggest that the environmental challenges now before us, such as hazardous waste and toxic chemicals, are in any sense trivial. But these are real improvements, and they should generate public confidence that we can handle serious environmental problems. Occasionally we should stop flagellating ourselves as a nation for problems unsolved and recognize that we are moving forward as mankind has always progressed—one step at a time.

"This is where some perspective can help. On both of the occasions on which I assumed the responsibilities of Administrator of EPA I saw my primary task as the establishment of public confidence in the ability of the agency to carry out its mandate. In 1971 that meant swinging vigorously at a few fat targets; in 1983 we had to show that we could still swing, even though the targets had become more numerous and more subtle.

"Although the current challenges are certainly more complex, I would feel like a fool giving you another speech today entitled 'The Environmental Crisis: Our Work Has Just Begun.' I realize that good news is no news, but the message must be sent to the American people that there is no need for legitimate concern to descend into despair and panic. Instead we should stand today on a plateau of hope, built by yesterday's assault on tough problems, problems that only then seemed intractable.

"We must learn to take heart from those past achievements. There is no reason why we should lack confidence that hazardous waste dumps or harmful toxics in the environment or acid rain will be controlled as we have controlled car exhausts and sewage. That is what my personal perspective teaches me.

"But there is no denying that many people have difficulty believing this. That difficulty arises not only from the failure to comprehend how far we have come in that first phase of our battle against pollution, but also from the changing nature of the environmental problems that seem to concern most people. These problems are related to toxic substances that have been associated with certain dread diseases, such as cancer or birth defects; substances that are insidious, invisible, seemingly omnipresent, possibly potent at vanishingly small concentrations; substances that number in the thousands; substances whose effects in most cases we know little about.

"It is enough to make one wistful about sewage. Because while anyone can tell the difference between clean water and dirty water, it takes an expert to tell the difference between safe and unsafe with respect to toxic contaminants. Worse, the experts don't always agree, and more often than not the data on which a reasonable consensus might be based simply doesn't exist.

"So dealing with toxics, either as products, emissions, or leakage from waste dumps, puts us in a very different sort of business. Instead of being able to speak of allowable doses and adequate margins of safety, we now must speak in terms of risk.

"People don't like that. They want assurances, not probabilities. One form of relief for this discomfort, which has been embodied in a number of our governing statutes, is to mandate the danger away by means of a zero discharge or zero risk goal. It is argued that such idealistic goals are necessary even if not immediately practicable—that man's reach should exceed his grasp. While I appreciate the reasons for such idealism, I don't agree that such goals are helpful in the workaday world of environmental protection, which is an intensely physical world, a world of hard-won increments. It is like climbing a mountain; if you reach for something you *literally* can't grasp, you're going to fall. The real problem with unrealistic goals is that they weary us with the sense of failure and cancel out much of the confidence that we should feel as the result of our successes.

"We must accept the fact that risk from toxic substances cannot be eliminated in an industrial society, although it can be significantly reduced. Fixing the extent of reduction and calculating and presenting to the public the balance between the protection thus afforded and other social and economic values has become an important part of our agency's mission.

"But there are some important limitations on our ability to do this as well as we might. The first is the public's unfamiliarity with environmental issues expressed in terms of risk. Some of this is our problem, of course, and we are currently involved in a major effort to improve the way we communicate such issues to the public and to improve the quality of debate on such questions. But I also think the press has a responsibility to inject some sense of the complexity of environmental health issues into its reporting.

"What, for example, are people supposed to think when they read that some substance in their environment is 'a suspected carcinogen'? Will the reporter tell them how strongly suspected? On what evidence? How potent is it? What are the risks involved, and how do these compare to other risks in life? I realize that the press is obliged to head for the controversial and that qualifications of this type do not make exciting copy. Still, the complexities are real, they're a legitimate part of the news, and a better effort to capture them ought to be made.

"The second, and perhaps more important, limitation arises from the tendency of environmental health issues to become an occasion for political posturing. This is, of course, nothing new. Throughout the 1970s Congress adopted many absolutist positions on environmental protection without necessarily thinking through what those positions would mean in practice, in

terms of cost or palpable environmental improvement. In a sense, EPA's statutory framework is less a coherent attack on a complex and integrated societal problem than it is a series of petrified postures.

"But we know more now and we should know better. We can't afford to continue the acrimony and posturing of the Sixties and Seventies into the present and coming decades. As I said earlier, the point has been made, the penny has dropped, even in the boardrooms of industry. No responsible segment of society now denies the importance of environmental protection. Why then, since we are all in the same canoe, can't we put our paddles in the water instead of flailing them at each other's heads?

"This tendency should concern all of us as the coming Presidential campaign heats up. There is some evidence that the environment will be used as a partisan issue, even though there is no evidence that either party has a monopoly on environmental virtue. A few days ago a Presidential candidate stood at a hazardous waste site in California and promised the people of the surrounding community that if elected he would immediately clean it up. That's a reasonably safe position, if not a notable contribution to environmental policy, especially as it implies EPA is not working as hard as it possibly can to fix these immense and long-standing problems.

"Another candidate was dump stumping in New Jersey just last weekend, and his contribution to the debate was to say that under this Administration not one toxic dump has been cleaned up in the last 3 1/2 years. That this is untrue hardly needs saying, but that a major presidential candidate could make a statement like that and expect to be believed is something that should concern us all.

"Let me put this in context: when we look at hazardous waste dumps we're looking at a public health engineering enterprise of almost unprecedented magnitude. It's not something you can dispose of with a stroke of the pen or a casual promise. To imply that thousands of hardworking professionals at EPA are not fully committed to the swiftest possible solution to this problem, or that the infinite and tedious labors that go into cleaning up a real dump, as opposed to a rhetorical one, will be miraculously rendered unnecessary by an election must strain the credulity of all but the most partisan minds. Contrary to political rhetoric we are not spending all day in the Environmental Protection Agency plotting to increase risk to the public. Short of helping the Democratic nominee for President what conceivable political motive could impel us to less than a maximum effort to clean up the dumps?

"This job of cleaning up waste dumps, like the jobs we've tackled successfully in the past, has got to be done carefully and has got to be done right, and it's going to be done about the way we're doing it now, *whoever's* in the White House in January. You can't bury that stuff in the Rose Garden.

"What concerns me most is that should the desire to make political capital out of legitimate environmental concern prove irresistible, a situation could develop that would be inimical to the achievement of any real progress in this area. If people running for office start wrapping themselves in the green flag of environmental purity, the chances are that even *more* unworkable legislation and *more* impossible strictures will continue to burden the Environmental Protection Agency far into the future. If political divisions become severe enough by November, damage may be done that will take many Novembers to repair. The major lesson of the unpleasant events of last year was that the American people will not tolerate the involvement of partisan politics in the operation of environmental programs. I hope that we all can keep that in mind as we thunder toward November.

"I've talked some about the past and tried to give you some perspective, derived from that experience, on the environmental problems of today. That leaves the future, which, as Mort Sahl pointed out, lies ahead. I think one of the reasons we are so careful about husbanding the resources that people want us to spend pursuing the headline risk-of-the-month is that we are starting to become more concerned about *environmental* protection in the wider sense of the word.

"Now, as in the past, we are repairing the damages we have done to each other and to certain obvious natural resources. But the environmental movement was founded on a wider vision, of the earth as a living entity, of nature as a seamless web, which we had the power to rend if we were stupid or knit up if we were wise. This vision has been our sustaining ideal, but we have hardly dealt directly with the great issues of planetary health. That time, I think, is almost upon us.

"We have already discovered that certain chemicals used in aerosol sprays and cooling systems have the potential for disrupting the ozone layer that protects the earth from radiation. We have begun to explore the effects of carbon dioxide buildup on our climate. These are both controversial associations and our positions on them have been questioned, but I believe that we must continue to expose issues of such global magnitude to public and scientific scrutiny. EPA is the natural focal point for such concerns.

"We are also starting to find that atmospheric pollutants can have effects far from their sources; acid rain is the most familiar example, but there may be others. Pesticides banned in the United States appear to be blowing in from other countries and showing up in fish in American lakes.

"We are losing topsoil at an alarming rate, and the most effective methods of preventing this, such as low-till or no-till agriculture, involve the use of larger than normal quantities of herbicides, quantities whose effects we are still unable to estimate. In our urban areas we have found that controlling point sources of pollution is not sufficient to clean the waters; non-point run-off must also be controlled, but this is a much more complicated endeavor, which could require planning, and possibly construction, on a very large scale.

"Our energy problem is sleeping for the moment, but we all know it will wake again, and we will have to make decisions — coal or biomass, solar or nuclear—which will have global environmental consequences.

"For reasons I have suggested it is hard to focus attention on issues that do not have immediate political relevance. We should have begun a major program of acid rain research ten years ago. We did not, and so we have crisis, and the possibility this entails of making grave errors in our rush to action. But we must at least try to live up to the promise in our name—the *Environmental* Protection Agency. Only then will we be able to fulfill our mission in its deepest sense, which is to shape the planet we intend to leave to our children.

"But as we move toward that lofty goal let's do so with confidence based on what we've already done. We should be facing the future on a plateau of hope, not a canyon of despair. If we don't forget that we'll be alright." □

Building a Better EPA

By Alvin L. Alm
Deputy Administrator, EPA

In a recent speech, EPA Deputy Administrator Al Alm discussed management today at EPA. He was speaking to the national conference of the American Society for Public Administration, meeting in Denver. Excerpts from his remarks follow:

"In addition to the generic problems that face all public managers to some degree, at EPA we are also challenged by the sheer complexity of our mission to protect public health and the environment and the natural conflicts arising from carrying it out through regulatory activity. EPA's mission is drawn from nine separate statutes:

- Clean Air Act
- Clean Water Act
- Safe Drinking Water Act
- Marine Protection, Research and Sanctuaries Act
- Resource Conservation and Recovery Act
- Comprehensive Environmental Response, Compensation, and Liability Act (Superfund)
- Federal Insecticide, Fungicide and Rodenticide Act (FIFRA)
- Toxic Substances Control Act (TSCA)
- Uranium Mill Tailings Radiation Control Act

The distribution and behavior of pollutants...do not follow the neat organizational prescriptions of EPA's enabling statutes.

"These statutes are not always consistent, and in some cases specifically direct us to consider different factors when regulating the same pollutant in different situations. The distribution and behavior of pollutants in the environment do not follow the neat organizational prescriptions of EPA's enabling statutes. A decision to control a pollutant in one 'medium' may create a new environmental problem somewhere else.

"For example, air pollution control equipment that removes sulfur gases from industrial boiler exhaust stacks creates undesirable sludge. Disposal of this sludge has itself become a growing problem. The point is that most regulatory decisions at EPA are inter-media and interdisciplinary. Each action invariably affects other regulatory programs and must satisfy a long list of legal, economic, and technical criteria as well. For a decision to satisfy all these constraints, it must run the gauntlet of the matrix organization that prevails at EPA.

"This leads to a very wide span of control for the Administrator. There are 12 separate line (regulatory) program offices in EPA Headquarters, each with a counterpart in each of the ten Federal Regions. In addition there are staff offices responsible for such essential activities as enforcement and compliance, policy, research and development, and administration. A lot of people are involved in any regulatory decision at EPA. Their different roles and responsibilities—each a function of the constraints I mentioned above—are capable of building tension and delay.

One of the biggest management challenges at EPA is to keep things moving...by making sure there is somebody authorized to say "yes"...

"One of the biggest management challenges at EPA is to keep things moving—and moving in a well-defined direction. I recall a comment from the director of a State environmental agency we interviewed in the course of developing a policy on delegating EPA programs to the States. He said, You know, at EPA anybody can say 'No.' What's really tough is finding somebody who can say 'Yes.'

"Management at EPA means going against this grain by making sure there is somebody authorized to say 'yes' as close as possible to the level a decision is going to affect. This calls for clear lines of authority and appropriate delegation of decisions. Sometimes that delegation reaches our Regions; increasingly it reaches the level of State program offices.

"This shift of authority and responsibility for day-to-day operations to the field presents special problems all its own. In a very real sense, as States gradually become the primary implementation arm for our national environmental programs, we are changing the way EPA does business. In effect this adds an additional layer of government we must work through to accomplish our mission. To make this work, we have begun to delegate program operating responsibilities down to implementing levels inside EPA as well.

"Since Regions have the responsibility to perform oversight and deal with States on a daily basis, we concluded that greater delegation to Regional offices is necessary. To accomplish this, I have made a clear distinction between the kind of work I expect the Headquarters and the Regions to be doing. In general, the Headquarters will:

- Provide national program development and guidance.
- Develop regulations and standards.
- Conduct research and development projects.

- Establish a framework of national oversight, including oversight of enforcement activities.
- Provide and interpret national baselines and trends in environmental progress.

"The Regions, on the other hand, will:

- Conduct direct implementation of non-delegated programs.
- Provide oversight to States managing delegated programs.
- Deal directly with States on operational matters such as how EPA's residual enforcement discretion will be exercised in specific instances, and provide other forms of day-to-day support.

"Meeting the challenge to get things done under all these constraints requires more than mere determination; the successful manager needs good tools and good people—and that is the heart of my message to you today.

"When Bill Ruckelshaus and I returned to EPA in May 1983, we saw the Agency facing a number of problems it was unable to solve for a lack of coherent policy: How do we solve the problem of dioxin contamination? What are proper roles, responsibilities and relationships for EPA and the States? What do we do to protect ground water? How can we integrate the assessment and management of risks from toxic pollutants across EPA programs and industries? We quickly chartered ten task force teams to come up with some alternative answers to these and other pressing questions. We wanted practical answers because we wanted to produce results quickly.

...we went to professionals with 'hands on' experience to come up with workable answers.

"We went to the people who would have to make the decisions work; we tapped the reservoir of talent and experience available from the senior career professionals at EPA. Under our general direction, these task force teams took a hard look at these problems and came back with alternatives and recommendations. The work of these task forces has already resulted in a comprehensive ground-water strategy, new approaches to enforcement, a blueprint for Federal-State relations and substantial delegation from Headquarters to the Regions—to just name a few accomplishments. The point is that we went to professionals with 'hands on' experience to come up with workable answers.

"At the same time the task force teams were developing answers to the policy questions, we set out to integrate our management system. That system must fit the circumstances of the Agency's management environment — in our case heavy decentralization to field operations and substantial delegation of program responsibilities to the States. In order to successfully run an organization like ours, three essential elements are necessary:

- Clear, consistent guidance from the top.
- Timely, results-oriented follow-up to ensure things are happening at the operational level.
- Technical assistance as necessary to enable the operational managers to succeed where problems arise.

...the Strategic Planning and Management System...is at the core of how we run EPA.

"The result is what we call SPMS—the Strategic Planning and Management System. Let me describe the system in some detail because it is at the core of how we run EPA.

"First of all, the system provides annual guidance. The Agency guidance is intended to give headquarters and regional office managers and staff, as well as our state and local partners, a clear indication of EPA's goals, operating objectives and priorities.

"The first part of our guidance includes a statement of agency goals by the Administrator. This section also contains the Administrator's view of the fundamental principles which must underlie our work to meet EPA's goals efficiently and effectively.

"The second part of the guidance is the Deputy Administrator's detailed operating guidance. That guidance will focus on those program activities where the agency will spend the most time, attention and resources. It does not intend to include everything the Agency must do to fulfill its general statutory, judicial or other requirements. Rather, it concentrates on those activities we deem most critical to meeting our environmental goals and objectives. This includes such priorities as achieving enforcement and compliance objectives, protecting our ground-water resources, implementing superfund programs and reducing risks from existing chemicals.

"The third part of the guidance is the establishment of the agency's priorities. These priorities are the product of extensive discussions between the Agency's senior managers, industry representatives, environmental groups and State environmental directors. This year the priority list includes 31 items.

...the top four priorities address program activities to control hazardous wastes.

The priority list helps the operating managers make the necessary trade-offs they will inevitably face throughout the year. To give you a feel for our thinking, the top four priorities address program activities to control hazardous wastes. Other major goals include expeditiously reissuing NPDES permits, implementing the ground-water strategy, and working with the States to incorporate non-point source control measures.

"The next step is for the national program managers to develop the two-year operating guidance, consistent with the goals and the priority list. This year we made major changes to the guidance document itself and to the process to ensure effective support of our overall goal of unified environmental management with the States. Thus, a comprehensive document has been developed that explicitly describes the broad direction for the Agency, the strategies our programs are using to get there, and clear operational guidance to implement those strategies.

"An important first principle was to fully involve Regions and States in preparing the program strategies which comprise the main body of the guidance so they can have a meaningful role in influencing the directions and approaches that are established by headquarters. Participation by the Regions and States at this point is particularly important because, later on, these parties will have the lead role in establishing the management commitments and evaluation measures which, in the aggregate, will comprise our national system of oversight.

"After the Agency's managers have prepared their program goals and strategies, they are consolidated into one document of manageable size. It clearly sets forth where the Federal and State environmental programs should be moving over the next two years and summarizes the management and operations strategies we will use to get there. This year the guidance was issued in time for the Regions and States to use in their grant negotiations commencing in March.

Commitments ... between EPA regions and States...might include issuing so many permits, making so many inspections...

"The guidance becomes the basis for agreements between EPA Headquarters, the Regions and the States on actual performance. Commitments are made by EPA regions to the Deputy Administrator, and between the Regions and States. For example, the commitments might include issuing so many permits, making so many inspections and the like. Headquarters program offices also commit to specific actions such as completing so many health assessments, standards, or policy documents.

"Any subsequent guidance issued during the year must be cleared by me. This is particularly important because the guidance is much more than a policy document. It includes the specific activities that will be used to measure success throughout the year. These are the measures we will use for establishing accountability within the Agency in evaluating managers' performance and in oversight of State programs as well.

Follow-up is the glue between plans and performance.

"But none of our planning is very useful unless we have a good system of follow-up. Follow-up is the glue between plans and performance. We carefully track our progress on commitments to ensure we are getting the desired results.

"Each quarter, we produce a formal progress report from SPMS for every program area at the national, regional and State levels. When the report comes off the press I sit down with each Assistant Administrator and go over the comprehensive picture of his or her program's performance. I also use the quarterly report as the basis for my biannual visits to the ten regional offices.

I also review their progress against the commitments we mutually established at the beginning of the year.

"I consider this direct two-way communication essential to our success. At these meetings, we will pursue any problems that are interfering with the timely achievement of our commitments. Rather than adversarial meetings, I see these as constructive opportunities to discuss each region's performance and for me to assist them in overcoming barriers.

Usually when I visit the Regions, I also try to meet with the State environmental directors. As in any large organization, information gets filtered. These meetings give me an opportunity to receive direct feedback and to reinforce the direction EPA is going.

"We have developed a new complementary action tracking system (ATS) at Headquarters to reinforce and strengthen SPMS. There has been historical criticism directed at EPA that it takes forever to get something done in the Agency. We discovered quickly how things can get months behind; the answer is one day at a time. To remedy this condition, I have begun biweekly meetings with the senior managers of the Agency to go over our progress for such priority actions as major regulations and standards, significant policy documents and responses to court-ordered deadlines.

...systems don't ultimately accomplish results, people do.

"We may have a couple hundred of these actions in the system at any one time; we focus on every overdue item. ATS has created a tremendous amount of discipline in the organization's management. It allows us to highlight and resolve problems that otherwise could drag on endlessly at the staff level, and to keep things moving.

"At EPA, however, accountability is more than an organizational concept. At the heart of our management approach is one important premise: systems don't ultimately accomplish results, people do. When Bill Ruckelshaus returned to EPA last year, he found EPA's greatest resource to be the same as when he started—its people. He was given a free hand to choose the people to lead the agency. We were able to reach out and get some of the most distinguished people one could find in their fields to take the top level management jobs at EPA. They joined a cadre of career people at EPA who are absolutely superb.

We need to encourage people to develop a broad range of experiences before they undertake more senior management jobs in the Agency.

"But we have some generic problems with our personnel system. These were identified by the National Academy of Public Administration in a report on EPA's personnel system. We have not grown our own managers at EPA because we lack a career development system. We don't encourage mobility and career development because we do not systematically plan for our human resource needs. We need to encourage people to develop a broad range of experiences before they undertake more senior management jobs in the Agency.

"We are creating an Office of Human Resources to develop a real career work force at EPA. That office will deal with personnel policy and career development; it will not perform the transactional functions of most personnel offices. What we are trying to get out of creating this new office is not a personnel system under another name. Rather, we hope to achieve a revolution in the way we plan for training and guide career development in the Agency. The new approach would link together the States, EPA regional offices and Headquarters into an integrated personnel management and human resources system. As a long-term objective, EPA should be willing to devote a significant number of top managers to work in the States, with comparable numbers of state personnel serving at EPA. If we are seriously dealing with an integrated environmental management system, then the personnel system has to be integrated also.

"Before I close, I'd like to briefly touch on where we are going in managing performance. We are just now beginning to make the important shift toward managing for results—in this case, environmental results. We recognize that measures we use now—such as the number of permits and regulations issued, the inspections conducted and the like—are but surrogates for the ultimate measure of our success: a clean and healthy environment. We understand the need to direct our attention to EPA's 'bottom line'—what happens in the environment as a result of our management actions.

We understand the need to direct our attention to...what happens in the environment as a result of our management actions.

"To this end, we are taking a number of initial steps. We are strengthening our monitoring programs to get the environmental data necessary to confidently measure success. To assure that this effort does not become a grand abstraction, we will be asking EPA officials to describe the environmental status in their programs and to justify how additional resources will result in either enhancement or protection of public health and the environment. This is admittedly an initial step along a long road. But EPA must keep open the vision of managing for environmental results even if it cannot be accomplished quickly or easily.

"Let me conclude by summarizing the kinds of things we need to develop a management system within EPA. Foremost, we need a vision of where we want to go and how we want to get there. We need a system that will take into account the decentralized and delegated status of EPA programs. We need to assure that EPA and the States not only understand but manage major policy guidance throughout the entire system. We need a system that assures accountability for success and allows for clear agreement on objectives and then a system of oversight. We need a system that provides continued follow-up. And finally we need a system that supports a career development system tying together these elements.

"I am absolutely convinced that the formidable obstacles in public sector management can be overcome. What you need is to work smarter with more effective tools and to involve your career people in the accomplishment of your objectives. I believe our system does both." □

Assessing the Future for Pesticides

What future do you see for pesticides? EPA Journal asked 13 leaders familiar with these chemicals their answer to this question. Those commenting included pesticide users, environmentalists and representatives of manufacturers. Their comments follow:

George Brown, Jr.

Congressman (D-Calif.)
Chairman, Subcommittee on Department Operations, Research and Foreign Agriculture
House Agriculture Committee

In the short run, pesticides will continue to be surrounded by controversy driven by public concern over older chemicals with inadequate health and safety data. As the uses of older chemicals are restricted or cancelled, pest-control costs will increase due to the need to use newer, and generally more expensive chemicals. At the same time, public concern will result in legislative and regulatory changes to address concerns over public health and safety and environmental protection, especially concerns over ground-water contamination.

However, this controversy will help usher in a new generation of pest control strategies which will be safer and more effective. Initially, the current generation of chemical controls will become better fitted to the target pest population and integrated with existing biological and cultural controls. Designed to reduce pesticide volume to save agricultural producers money, minimize environmental hazards, and deal with increasing pest resistance to pesticides, these Integrated Pest Management (IPM) strategies will demand more research into target-pest biology and ecology.

This basic and applied research will be aided by new biotechnologies which will help isolate insect and pest pathogens, hormones and pheromones, mechanisms of pest resistance, and other useful information. Combined with a better understanding of pest ecology and a program of environmental monitoring, an applied program of integrated chemical, biological, and cultural strategies will dominate pest control and reduce pesticide volume. Advances in information and communications technologies will allow agricultural producers to further refine integrated strategies and speed their applications.

In short, we are moving toward safer and more effective pest control strategies, with a research-based information content predominating over the continual increase in chemical agents, but only after near-term controversy and major research investment in biological pest control.

Maureen Kuwano Hinkle

Environmental Analyst
National Audubon Society

As an environmentalist who has been involved in the legislation, administrative implementation, and litigation of pesticide regulation for twelve years, I am disturbed at the continuing introduction of pesticides in new ways and in a greater variety than ever before with so little understanding of what this may mean.

When first marketed in the 1950s, organochlorines were seen as a miracle to end the devastation of crops by pests. Yet it was the unrestrained use of those pesticides that caused pests to become resistant, as greater quantities were applied in efforts to control or eradicate them. The unrestrained use of DDT, Aldrin/Dieldrin, and Chlordane/Heptachlor resulted in detectable residues of these pesticides in the blood and fatty tissue of nearly all Americans by the 1970s. The result was litigation and eventual bans on most of their uses.

Unrestrained use of EDB as a fumigant resulted in widespread contamination of grains and other food. Unrestrained use against soil pests also resulted in contamination of ground water. It was largely the unrestrained efforts of the regulated industry to deregulate that aroused the attention and fury of an entire nation. Suspension against uses of EDB by EPA was one result.

If there is to be a positive future for pesticides, the very nature of the problems posed by pesticides demands a greater understanding of pesticides than we now have. This includes investigation

of synergistic interactions, and identification and research on inert ingredients, contaminants, and impurities. We need better and more precise predictability of chemicals once released into the environment. We need the analytical capability to detect chemicals, the identity of their degradates, and where these migrate. More needs to be done on application technologies, for we need to get the chemical to where it is needed and to keep it from spreading. In the interim, restraint from industry, users, and from EPA in approving registrations without good support data would go a long way to allay the anxieties and fears now justifiably held by the public at large.

Above all, the federal government must exercise its mandated authorities to control the use of pesticides in a timely and equitable manner, and to take appropriate action before it is externally forced.

Robert Oldford

Chairman
National Agricultural Chemicals Association

A look at agricultural chemicals brings into focus a cluster of issues critical to our future. One way to address this, it seems, is to redefine a concept already well known to agriculture, Integrated Pest Management, and develop along the same lines a philosophy and practice of "Integrated *Pesticide* Management" — an approach that combines independently strong systems of regulation, basic and applied science, environmental protection and government.

The contribution of agricultural chemicals to the well-being of agriculture, our single largest industry, is enormous. Efficiency, not magic, allows one American farmer to produce enough food and fiber for 80 people and produce 64 percent of the world's soybeans, 46 percent of the world's corn, and 17 percent of the world's wheat. Agriculture contributes 45 billion dollars a year to the U.S. balance of trade, provides us with the lowest food costs of any developed society, and in one way or another, accounts for one of five jobs in the United States today. Agricultural chemicals are tools basic to that efficiency, and vital to our continuous struggle against bounty's adversaries: weeds, insects and disease.

Integrated Pesticide Management requires a responsible regulatory system firmly rooted in science, vigorous in protection of the environment and credible in the public eye. Scientifically based review and responsible regulation of agricultural chemicals must continue to be strongly supported by the agricultural industry; such processes are essential to our own well being.

The EPA also must serve as a philosophically sound and scientifically directed resource to provide state and regional affiliates with principles of direction-setting that are consistent, timely and factually based. Otherwise, we run the risk of foundering in "border justice" — a crazy quilt of inconsistent and often unenforceable restrictions, which further erode public confidence and hinder the ability of agriculture to do the job it demonstrably has proven it can do so well.

Our integrated management system needs to be communicated effectively. Knowledge evolves, technologies mature, and our capability for risk assessment increases. But these improvements often confuse the public at large. Thus, it is our task to educate the public so it can identify the pertinent environmental issues and understand what is meaningful and what is not.

While there can be no place in our system for false alarms of "fire" on our crowded, hungry planet, there is most definitely a place of dialogue with legitimate groups whose points of view differ from our own. Industry/environmental advocacy dialogue has already begun to show results, and our commitment to seek further areas for consensus must be firm. Every span we develop in bridging the chasm of distrust can bring us closer to mutually productive goals.

Application of this basic principle of ecology, a recognition of mutual dependencies, will enhance every element of our agricultural system, and bring renewed vigor to each. The ultimate ends of environmental, economic and human health are all interrelated, and that which diminishes or strengthens one will diminish or strengthen all.

John S. Barr, III

President
National Cotton Council

Statisticians report that world population is still growing by record numbers despite a slowing of the percentage growth rate since the mid-1960s. Last year alone, an estimated 82 million people were added to global population. Because of this continuing growth, some predict we will have to produce more food and fiber in the next 50 years than in all the previous years of mankind.

The propect poses a real challenge to those of us in agriculture and especially to those of us who grow cotton which is both a food and fiber crop.

We cannot successfully meet that challenge without the continued judicious use of pesticides. The temperate climates where cotton is grown, its longer growing season, and indeterminate fruiting patterns all combine to make cotton a target for more destructive insects, weeds, and diseases than any other major crop.

To minimize environmental pollution propects as well as control costs, cotton farmers pioneered in developing and practicing Integrated Pest Management. Specially trained scouts now monitor fields weekly or more frequently to determine population levels of destructive and beneficial insects. Instead of automatic-schedule spraying, growers now make insecticide applications based on this monitoring.

A successful boll weevil eradication program in the Carolinas may soon be expanded into other cotton-growing areas. Once the weevil is eradicated, beneficial insects can be expected to help hold the bollworm and tobacco budworm in check.

These are positive steps to minimize chemical pressures on the environment. There are numerous others — such as increased use of biological and cultural controls in conjunction with pesticides,

genetic breeding of insect-resistant plants, and so on.

Cotton farmers are moving responsibly. In turn, they trust that federal and state officials who make decisions on pesticide registration and use regulations will act responsibly as well: weighing real benefits against real risks and making decisions on the basis of valid scientific evidence.

By working together in a cooperative spirit of mutual trust and understanding, we can assure adequate food and fiber plus a safe environment for this and future generations.

Seymour Johnson

Past President
American Soybean Association

First, we see a changing attitude about what pesticides are and are not by users, regulators and the general public. We are moving from a period torn between ignorance and public alarm to one of rational understanding.

We now recognize that there are good pesticides as well as bad ones. We are coming to realize that judicious and informed uses of pesticides can be accomplished.

The general public seems to be comprehending that higher food costs associated with the lack of pesticides would have a far greater impact on the quality and quantity of life than managed and knowledgable use of pesticides will have.

We are also seeing that as the environment improves, new pests arise and that a "good" environment is not necessarily a static environment. We will continue to encounter new problems but find clearer solutions.

The public is slowly leaving the attitude that a pristine wilderness is the ideal environment, which it certainly is not for man.

We are slowly approaching a period of enlightenment and leaving a period of confrontation and confusion.

Robert F. Harbrant

President
Food and Allied Service Trades Department, AFL-CIO

The recent finding that many toxic pesticides remain in food products will no doubt alter the course of pesticide use in this country. The emphasis now will be on using pesticides that dissipate rapidly and leave no residue in the product, rather than the liquid fumigants, such as those whose supposed benefit lay in their long-lasting power. The move away from these heavy, long-lasting liquid fumigants (such as carbon tetrachloride-based fumigants or ethylene dibromide) could mean a safer world for both consumers and workers. But, that is not guaranteed!

For twenty two years after *Silent Spring*, pesticide abuse and misuse continues in the workplace. Though pesticide legislation has attempted to control the use of pesticides, workers continue to be overexposed to some of the deadliest chemicals known to man. The current regulations governing many of the most popular fumigants cannot assure either worker or consumer safety. Our recent experience with EDB - where regulations on safe application methods were virtually nonexistent, where the pesticide labels never communicated any of the long-term risk involved, such as cancer, and where training was not required for the applicator - is a glaring example of inadequate regulation which led to widespread exposure. Had strict regulations existed for the use of EDB, this exposure and risk might never have occurred. The move to lighter, gaseous fumigants must be coupled with a renewed sense of urgency about worker protection. No longer can workers be the sacrificial lambs.

The move towards light, more gaseous fumigants may also kindle a search for alternatives to pesticides. For example, a few pioneers in the grain industry have been experimenting with CO2 as a means of preventing infestation. Other companies are using heat. And others have been looking at insect protectants such as malathion, which protects grain from infestation. And hopefully, there will be others that may try to prevent infestation completely by minimizing the conditions in grain that are conducive to pests - such as the interaction of temperature, moisture and growth. Much can be done on this front, including harvesting when the grain's moisture content is right and proper aeration of grain. Government policies which support the use of these alternatives to toxic pesticides will be of the greatest benefit.

S. Jacob Scherr

Senior Staff Attorney
Natural Resources Defense Council

Pesticides are already a matter of substantial concern and controversy in nations around the world. In the coming years, their overuse and abuse may emerge as the major international environmental issue of the 1980s. Pesticides will no longer be viewed as primarily a problem for the industrialized countries, but increased attention will focus upon the developing world.

The use of pesticides has spread much more quickly than the capability to assure their safe use. Pesticide poisonings have already reached epidemic proportions in some developing nations. Poor farmers there often have little or no understanding of the hazards posed by pesticides nor access to protective equipment. Governmental capabilities to regulate pesticide production or use are uniformly inadequate and sometimes nonexistent. Overuse is leading to increasing pest resistance, which is undermining the effectiveness of pesticides in agriculture and of malaria-control programs.

There will be growing demands to end what many perceive as a double standard in the laws of most industrialized countries, which freely permit the export of pesticides that have been banned at home. The developing countries are viewing themselves more and more as consumers in the global

pesticide marketplace and are pushing for the establishment of some basic standards for trade in pesticides. Work has already begun on an international code of conduct. While some ideologues will continue to rail against what they see as "international nannyism," governments, citizen organizations, and industry will increasingly cooperate in seeking solutions to the global pesticide dilemma.

Dr. Robert H. Kupelian

National Director
Interregional Project Number 4
New Jersey Agricultural Experiment Station
Rutgers University

The production of food and fiber is the largest and most important business in the world. Water, nutrients and pesticides are tools used to not only maximize agricultural production efficiency but in cases where climatic and pest pressures are great, to assure that at least a portion of the crop is harvestable and salable. There are many instances in both modern and ancient history where destruction of crops by pests has led to widespread starvation and mass migrations by the peoples affected, e.g., the Great Famine in Ireland of 1845-9 when the fungus *Phytophthora infestans* rotted potatoes, the principal subsistence of nine-tenths of the Irish population. Ireland lost almost a third of its population as a direct result. About a million died from starvation or disease following malnutrition. A million and a half more Irish emigrated.

Pests have competed with man for crops in the field or in storage every day of every year since the beginning of recorded history. Because of this perpetual struggle, all nations will need to use some form of chemical pest control to assure a reliable food source for the four billion people currently living on earth and future generations destined to join them.

Many people mistakenly believe that the use of pesticides is fabricated and unnecessary. It would be interesting to speculate on the condition of the agricultural industry in California, for example, if the use of all pesticides were forbidden by law in that state for the next ten years. How many shoppers have you seen recently buying "blemished" fruits or vegetables in your local supermarket? While we must use pesticides, we are obligated to ensure that those cleared for use not only are efficacious but also do not impact adversely on man and his environment. By doing this, we can maximize the benefits of using pesticides (and there are many) and minimize the risks. It behooves us also to utilize Integrated Pest Management programs whenever practical.

Five facts are worth remembering:

1. Pests attack crops above and below ground and anywhere in the food line from farm to table.

2. Pesticides protect our food crops, non-food crops, ourselves, our homes, our pets and livestock.

3. The average American spends a lower percentage of his after taxes income for a safe and plentiful supply of food than the citizens of any other nation.

4. World-wide food losses from pests vary from 15 to 75 percent and the population continues to increase. Malnutrition is common and about 40 percent of the people are on the verge of starvation, i.e. "hunger walks a thousand streets."

5. The United States is the world leader in food production. Protecting our food is vital to a happy and prosperous America. Sharing both our agricultural technology and food with others in foreign lands is important because hunger imperils world peace.

Is there really a choice? I think not — pesticides do have an essential place in man's future.

J. M. Wise

Manager
Regulatory Affairs, Farm Land Industries, Inc.

During the early days of pesticide development, little was known about either the method of action or the potential environmental fate of pesticides. Products which were introduced into the market were broad spectrum and controlled the maximum number of pests in the maximum number of sites. While these early pesticides were effective in the control of unwanted pests and served as a valuable agricultural tool they were later shown to have the maximum adverse effects on the environment and non-target species.

The pesticides of the future will be developed through new developments in chemistry and bio-engineering which will produce compounds or organisms which will be pest- and site-specific. These new generation pesticides will provide us with the ability to protect our environment to the greatest extent, while at the same time assuring the continued development of our agricultural resources and the protection of public health.

While this may seem to be a projection more suitable to a Buck Rogers novel, such developments are today underway within the laboratories of progressive chemical companies in the United States. Based upon current reports it is hoped that we will be seeing the first of these compounds entering the markets within the next few years.

W. J. (Dub) Waldrip

Immediate Past President
National Cattlemen's Association

I think the future for pesticides is bright. In fact, they're essential to continue productivity and effectiveness in American agriculture. We, on the farms and ranches of America, couldn't get along without them.

I think with our improvements in technology and our increased effectiveness in developing safe pesticides, that there won't be any diminution in the use of pesticides.

Nobody is in favor of material that is dangerous. Nobody is for a poor environment. By the same token, I don't think anybody is for extremely high living costs, or starving part of our population because they can't afford our production. Unless there is some startling breakthrough in pest management, pesticides will be essential in providing a plentiful and economical food supply.

Hard questions must be asked regarding the cost/benefit ratio. There are socio-economic realities to this question. Sociologists are all against pesticides and economists are all for them. We must be realistic and recognize that the answer is somewhere in between.

By John R. Forrest

Chairman, Board of Governors,
National Forest Products Association

The forest industry manufactures many products, including lumber, plywood, and paper, from the trees it grows, and needs to manage its forestland effectively to supply these products.

Forest management includes a series of practices designed to increase productivity, including proper harvesting to leave a good planting site; site preparation; crop regeneration; grass and small weed control; insect control; release from competing brush, trees and other large vegetation; fertilizing; and thinning. Insecticides may be required; herbicides are frequently useful in site preparation and in control of grasses and competing vegetation that would otherwise deprive the trees of needed sunlight, water and soil nutrients.

A professional forester must review many factors (e.g., the species of tree being grown, the time in the life cycle, the type of competing vegetation and non-target species, the presence of wildlife and bodies of water, the nature of the terrain, and the quality of the soil) before prescribing the forest management practices necessary in each area. Each year, herbicides are prescribed for only a very small percentage of the total forest acreage — but for those areas, nothing else will provide the needed control of competing vegetation. Most of the nation's forests are never sprayed. And those which require herbicides are treated only once or twice during a growing cycle of 50 years or more.

The forest products industry is interested not only in increased productivity, but also in protecting our employees and neighbors and the environment from potential risks from forest chemicals. The industry uses technology and approved additives designed to avoid spray drift and to put the pesticides directly where needed. The industry has also sponsored applicator-exposure studies.

EPA has the difficult task of weighing risks and benefits in making decisions on pesticide registrations and use restrictions. As is proper, the risks are often emphasized. But the benefits story is rarely told.

Robert J. Dold

President
National Pest Control Association, Inc.

Pesticides will continue to play an important role in combating pest species which threaten man's health or property.

Specific chemicals may become obsolete or give way to others with more acceptable benefit/risk coefficients. New resources and methods of application will appear, some with innovative sites of action; some quite species-specific; and others as "modifiers."

But in their generally accepted concept, pesticides are as integral a component of modern urban pest management as drugs are a viable form of therapy in medicine.

In the United States, the structural pest-control industry realistically recognizes the role the present registered pesticides play as part of their total arsenal of urban pest-management procedures. The training documents, technical releases and official Good Practice Statements of the National Pest Control Association clearly define where the proper use of these agents fits in a program which includes environmental modifications, exclusion, and sanitation, etc., as a broad spectrum approach.

NPCA's long-term perspective accepts the need for continued emphasis on proper application techniques and an intelligent selection process of the best agent to use for a specific situation.

What it can neither control nor anticipate is that the rules of reason, balanced determination of benefits, and scientific discipline will determine which pesticides are available for our use. Like the ultimate consumer, the pest control operator does not design, manufacture or set the standards of use for the chemicals placed at his disposal.

Charles Horwitz

Staff Attorney
Migrant Legal Action Program, Inc.

The research and development of Integrated Pest Management (IPM) techniques is the key to improving farmers' ability to control pest losses safely, cheaply and effectively. It is also essential to reducing harm to humans and the environment.

Among other crucial needs, environmentalists and labor must create the means to more effectively wage the public debate against the overuse and misuse of toxic chemical pesticides.

To effectively win the hearts and minds of the American public about pesticide dangers and to present scientific testimony before Congress, administrative agencies and the courts, it is essential to have significant input from competent scientists. For many years, legal services, labor, environmental and consumer groups, which lack paid scientific staff, have spent much time seeking *pro bono* scientific assistance. Industry, on the other hand, has many scientists on the payroll, and in addition, has created a front group, CAST, which parades as a neutral body of prestigious scientists. Farmworkers and our public interest allies need an organization which, *in fact*, is composed of competent, fair, yet committed scientists who understand the need to interpret scientific issues to the general public.

Among the many purposes this organization would serve are the following:

1. Educating fellow scientists about pesticide public policy issues and recruiting them to be active organization members.

2. Educating policy makers in Congress, EPA, the Occupational Safety and Health Administration, and other federal and state governmental agencies regulating pesticides; commenting on proposed regulations and presenting testimony.

3. Writing interpretive scientific analyses on public pesticide problems in influential periodicals and news media. Encouraging more epidemiologic studies and independent scientific toxicology studies by public and private universities and state and federal governement agencies.

4. Advocating more extensive pesticide training for medical students in medical schools. □

Registering Pesticides

A household collection of bug killers, disinfectants, air sanitizers, and pet care products shows the variety of items subject to EPA pesticide registration procedures.

EPA's Office of Pesticide Programs has two major functions: *registration* of pesticides, by which EPA licenses the manufacture and sale of new pesticide products on the basis of safety testing data; and *reregistration*, which is a re-examination of old pesticides to be sure they meet the most current standards of safety testing. These two functions are part of EPA's mandated responsibilities under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and the Federal Food, Drug, and Cosmetic Act (FFDCA). The agency administers the pesticide provisions of the Federal Food, Drug and Cosmetic Act jointly with the Food and Drug Administration.

The Federal Insecticide, Fungicide, and Rodenticide Act began in 1947 as a consumer protection law, primarily protecting pesticide users from ineffective products. In 1972, in light of growing concerns about the potential risks of chemical pollutants and advances in scientific research techniques, Congress amended the Act, shifting its central purpose to health and environmental safety. The 1972 amendments directed EPA to impose new comprehensive data requirements on all applicants for pesticide registrations, as well as on registrants of old products. The data would ensure that the widespread use of any registered pesticide would not cause unreasonable adverse effects to people or the environment. Further, in recognition of the importance of many pesticides to agricultural production, sanitation, and disease control, Congress tied all pesticide regulatory decisions to a balanced consideration of both benefits and risks.

In 1975, EPA issued new regulations for registering pesticides in accordance with the principles of the 1972 amendments. The new data requirements included an extensive range of general chemistry, environmental fate, short-term and long-term toxicology, ecological effects, and crop residue studies. Together these data can effectively anticipate such potential problems as flammability, corrosion, dispersion or drift, runoff, ground-water contamination, persistence, bioaccumulation, acute poisoning, birth defects, tumor induction, sterility, and hazards to fish, birds, wild mammals, and endangered species.

Based on experiences with these data requirements since 1975, the agency proposed even more comprehensive and detailed requirements in 1982. A year later, EPA published complete technical guidelines on how to conduct the required studies. As future advances arise in the technology of chemical testing and in our knowledge about the potential effects of pesticides, EPA expects to update and amend the data requirements further.

From Synthesis to Sale

From the time a potential new pesticide chemical is synthesized in a company laboratory until it is placed on a shelf for sale, from five to nine years may pass, during which time the new product is fully screened, tested, reviewed, and approved. A minimum of one to two years are spent on patent review, market research, and initial efficacy and toxicology screens, to ensure that the chemical is a viable and usable product.

The next three to five years are for major testing. The company first obtains from EPA an Experimental Use Permit (EUP), which is supported by some of the early screening data. Then field trials are conducted to determine effects on crop yields, residues remaining on harvested commodities, and the most effective formulation and application methods. At the same time, all the health and environmental safety studies required by EPA are carried out at the company's expense according to the agency's technical guidelines. At this point, a preliminary consultation with EPA registration staff may be useful to ensure that all the needed studies are under way.

The last one to two years of a pesticide's development consists of EPA's registration process, which is conducted in four basic phases.

In the first phase, the company prepares and submits its application materials to EPA. This includes a confidential statement of the pesticide's formula, final reports of all the health and environmental safety studies, and

labeling that precisely describes the proposed sites of use, application rates and methods, and any special limitations. For all pesticides, EPA expects that the applicant will have conducted efficacy trials to verify that the product is effective for its intended purpose. However, recent amendments to the Federal Insecticide, Fungicide, and Rodenticide Act allow the agency to waive the requirement that these data be submitted and reviewed. If the pesticide is intended for use on a food and feed crop, then the pesticide provisions of the Federal Food, Drug, and Cosmetic Act require EPA to establish a tolerance, or maximum legal residue level, for that chemical on the treated commodity. So, for a food-use pesticide, the company must submit, in addition to the registration application, a petition for a tolerance. This petition is supported by residue data from the company's field trials, to show that the proposed tolerance is not likely to be exceeded, and copies of long-term toxicology studies, to show that the proposed tolerance will adequately protect public health.

The second phase of the registration process is EPA's initial administrative processing, including assignment of the application to a product manager to track and manage its review, assignment of file numbers, and review of application materials for administrative correctness and completeness.

In the third phase, agency scientists conduct an in-depth evaluation of all the health and environmental protection data, including the data supporting the tolerance petition. The scientists first critically examine the study protocols and the record-keeping techniques used to generate the reported data, using agency guidelines as a standard. Then they offer their own conclusions on what the data imply about the properties and potential effects of the pesticide, and on whether the data support the uses and conditions specified on the proposed label. For proposed food crop uses, a tolerance assessment is performed in response to each petition.

In the last phase of the registration process, the product manager informs the company of the scientists' conclusions. If the data satisfactorily supported the proposed uses, then a final label is worked out to show all the appropriate warnings and precautions, tolerances are formally established, and the registration is announced in the *Federal Register*. If the supporting studies were inadequately performed, yielded ambiguous results, or indicated unreasonable risks to man or wildlife, then the company is so informed. In response, it may choose to alter the proposed uses or generate additional data to support its original proposal.

Once a new pesticide chemical is registered, companies may wish to register other uses or formulations of the same active ingredient. The same four-phase registration process is followed for these applications, but the required supporting data is limited to that which pertains only to the new product.

Updating Old Reviews

In addition to stengthening the health and environmental safety provisions of the registration process, the 1972 amendments to the Federal Insecticide, Fungicide, and Rodenticide Act required EPA to undertake the monumental task of rereviewing, by today's scientific standards of safety, all previously registered pesticides. Between 1947, when FIFRA was first passed by Congress, and 1970, when EPA inherited responsibility for FIFRA and parts of FFDCA from the U.S. Department of Agriculture, approximately 600 active ingredients and 50,000 different pesticide products were registered and marketed in the U.S. The registration files passed to EPA contained hundreds of thousands of safety and efficacy reports that had been submitted by the products' manufacturers in support of their applications.

EPA pursued a deliberate long-term strategy for reviewing these old chemicals, dealing first with identified problem chemicals, obtaining new data on chemicals with data bases inadequate by current standards, and modifying or reaffirming previously approved uses on the basis of the new data.

First, EPA identified the problem active ingredients, and under a new authority granted by the 1972 amendments to FIFRA, issued notices of intent to cancel old registrations which appeared to present risks of unreasonable adverse effects. For the first several years, these notices (such as the one for DDT) resulted in lengthy, formal adjudicatory proceedings, where risks and benefits evidence was presented in trial-like hearings.

In 1975, the agency initiated a more efficient way of acting on problem chemicals. EPA's 1975 regulations on pesticides included a list of pesticide effects which the agency would "presume" to be unreasonable — effects such as tumor induction, birth defects, and sterility in humans, and significant population reductions in wildlife. This "presumption" could be "rebutted" by the registrant or the public, by showing that the effects data were not valid, that risks could be reduced, or that the chemical's benefits outweighed its risks. The new process for dealing with problem chemicals was called "Rebuttable Presumption Against Registration" or RPAR. More recently, it has been renamed the "special review" process.

Since this process became operational in early 1976, some hearings have still been held to challenge and test the validity of agency decisions. But because the special review process involves public and other external reviews through the analysis of risks, benefits, and regulatory options, it has proven to be an equitable and effective means of dealing with the old chemicals already suspected of posing extreme hazards. Special reviews of suspect chemicals will probably continue to be conducted as new data are obtained on old chemicals with deficient data bases.

The agency's program for upgrading the data bases of old chemicals is known simply as Data Call-In (DCI). Letters are sent to registrants, identifying long-term toxicology testing needs, and requiring the immediate initiation of these important health-protection studies.

Finally, the actual reregistration of old pesticides, as mandated by the 1972 FIFRA amendments, is taking place under a program called "Registration Standards". Registration Standards are published reviews of all the data available on a particular pesticide's active ingredient. They are called "Standards" because, on the basis of the data reviews, they set the standards of manufacture, use, formulation, packaging, labeling, and product-specific testing which must be met for a company to register a product containing that active ingredient. The Data Call-In program is timed so that all critical data will be available by the time a Registration Standard review is begun. After each Registration Standard review is published, all the old pesticide products which contain the reviewed active ingredient are compared to the standards it sets out. Only those products which meet the standards will be reregistered. Registrants may later apply for an amendment to a Registration Standard on the basis of new data, so that new uses or formulations may be added to it.

EPA's strategy for reviewing old chemicals — including adjudicatory hearings, RPAR special reviews, the Data Call-In program, and Registration Standards — has made considerable progress in examining the major pesticides used in this country. Virtually all of the sixty-two largest U.S. production insecticides, herbicides, and fungicides will have been subject to one of the above actions by 1985. □

Setting Limits on Pesticide Residues

A shopper selects asparagus in the produce section of a supermarket. EPA sets tolerance levels for pesticide residues on our food.

Virtually every food and feed commodity grown commercially in the United States is treated with one if not several pesticides during cultivation, harvesting, storage, and processing. How, then, can the public be assured that the food they buy is safe to eat?

EPA has the authority to set tolerances for pesticide residues in food or feed. The tolerances are required under the federal Food, Drug, and Cosmetic Act. Tolerances represent the maximum allowable pesticide residue levels legally permitted in food or feed.

A tolerance must in fact be established before a pesticide may be registered for use on a food or feed crop that is intended for sale, distribution or consumption in the United States. A food additives tolerance is required when a pesticide is added to a processed food. Also, if a pesticide carries over from a raw agricultural commodity such as wheat to a processed food such as flour, a food additive tolerance is required if the residue in the flour is concentrated to a higher level than it was in the wheat.

The Food and Drug Administration (FDA) is responsible for enforcing the tolerances for food and feed commodities in commerce, except for meat, eggs and poultry which are inspected by the U.S. Department of Agriculture (USDA). Food containing levels of a pesticide exceeding the tolerance level are subject to seizure or condemnation by either FDA or USDA. In annual market-basket surveys conducted by FDA, pesticide residues found in foods available to consumers have been consistently lower than established tolerance levels.

Tolerances are established by EPA upon receipt of a petition from a pesticide registrant. The petition proposes a residue level which the registrant believes is safe and is suitable to cover residues resulting from the proposed pesticide use. This proposed level is derived from required toxicological studies, including acute and subacute tests, and chronic feeding, reproductive, oncogenic, mutagenic, and teratogenic tests. EPA toxicologists examine and evaluate the petitioner's data to determine an appropriate tolerance level. They establish tolerances at levels well below those likely to cause any adverse human health effects.

Tolerance Assessment System

The existing system and data base used by EPA to establish pesticide tolerances have become inadequate to address many current health issues. To correct these shortcomings, EPA is developing a new computer-based Tolerance Assessment System (TAS). This new system will refine, update, and expand the agency's estimates of human exposure to pesticides through the consumption of treated foods.

The Tolerance Assessment System will use new government data on food-consumption habits and food-preparation techniques, and will be capable of updating the data quickly and easily. The system will also permit determination of food consumption for individuals and people with unique dietary patterns, such as infants and other subgroups defined according to age, sex, region, and socio-economic and ethnic categories.

The system will account for variation in food consumption per unit of body weight. This is important in calculating exposure which is directly related to food consumption. When estimates of food consumption for subgroups of the population are known, then adjustments for body weight within each subgroup can be made. Thus, level of exposure can be determined on an individual basis.

Using the Tolerance Assessment System, risk estimates will be calculable for daily food consumption patterns (acute exposure) as well as for annual food consumption patterns (chronic exposure), to better reflect actual exposure. In this way, extremes of food consumption can be detected and the risk from a single exposure can be calculated.

The Tolerance Assessment System will consider the actual pesticide residue levels in food when consumed after processing and refining. This will enable a more precise estimate of exposure. The system will also permit measurement of exposure to any pesticide metabolites created during the processing of agricultural commodities.

To help determine the extent of exposure which occurs in nonfood sources, the system will include estimates of water consumption which will add to the accuracy of exposure assessments.

In summary, the Tolerance Assessment System will give EPA the ability to better estimate human exposure to pesticides through food consumption, thus enabling the agency to provide better protection to the public from undue or potentially unsafe exposures. □

The Benefits and Risks of Pesticides: Two Views

What are the benefits of pesticides compared with their risks? How can good results in pest control be insured while the public and the environment are protected against any dangers? EPA Journal asked two prominent spokesmen in areas associated with pesticides to express their views on these concerns. Their articles follow.

The first piece is by Nicholas L. Reding, executive vice president of Monsanto, a chemical manufacturing company, and a former chairman of the National Agricultural Chemicals Association. The second piece is by Dr. Robert L. Metcalf, Professor of Entomology, Biology, and Environmental Studies and Professor at the Center for Advanced Study at the University of Illinois at Urbana-Champaign.

Seeking a Balanced Perspective

By Nicholas L. Reding

Recently, I received a letter from a high school student who lives in Pennsylvania. She was writing a research paper and wanted our help. The title was, "Pesticide Abuse and Pesticide Danger."

The letter bothered me deeply. First because the title summarized everything she knew about modern pesticide technology. Second, because she isn't alone in her views. For many people, pesticides mean either abuse or danger.

I don't agree with that view, of course. I see the commitment the industry has to testing its products, the emphasis on minimizing risks, the efforts to train pesticide applicators around the world, and the constant reappraisal of the industry's methods to keep improving. As my industry colleague, Dale Wolf of DuPont, said at last year's annual meeting of the National Agricultural Chemicals Association (NACA): "The highest priority of your companies and mine was, is and will continue to be the safe manufacture, transportation, use and disposal of agrichemicals." Those aren't hollow words.

In fact, I see a responsible industry that makes products that provide great benefits by controlling pests that attack crops, homes and health. And I see a scientific community that is beginning to put the possible risks of pesticides in a clear, less frightening perspective.

But I also try to understand why many people are concerned about our products. To a great degree, it's because of the success of the environmental movement in changing the way everyone from activists to industrialists views the world around them. We're more aware, more sensitive and more responsive. It's a positive change.

It's also the result of technological change. We can now detect materials in the environment that we never knew existed there before. Parts per billion, trillion and quadrillion are extremely minute traces of any material, but these words are the language of modern contamination. Our ability to understand what those traces mean isn't always so advanced.

Concern is also the result of extremely effective actions by activist groups. From Earth Day on, the mistakes, misjudgments and stumblings of all industries have been chronicled, spotlighted and rehashed at every opportunity — often, long after the effective changes have been made. It's all made to order for a news media which delights in high drama and controversy.

And the industry has brought some of the concerns upon itself. As criticism mounted, we often became reactive and combative. Or worse, we ignored legitimate concerns, even when we had the answers. We should have heeded Winston Churchill when he said, "I do not resent criticism, even when, for the sake of emphasis, it parts for a time with reality."

I'm not always so generous. I do believe that, at times, environmental crises over pesticides are manufactured for maximum effect. Moreover, some critics relish the fight more than the solution. But the vast majority of concerned people are sincere and deserve a response based on facts, not on hurt feelings.

The facts do support pesticides. This is not to argue that they are always safe, everywhere. Pesticides are chemicals designed to control insects, weeds, fungi, nematodes and other pests. They are biologically active and, to a greater or lesser degree, toxic. They must be used carefully and according to label instructions. But they can be and are used safely and produce benefits for millions of people.

My industry accepts its responsibilities in the area of product safety. Pesticides undergo incredible testing — often more then 100 different kinds of health and environmental studies which require thousands of individual analyses. These products must be effective while not posing unacceptable risks to humans, livestock, the environment or food. To establish that, we do tests on efficacy, crop safety, short- and long-term toxicology, metabolism in crops and animals, residue and environmental fate.

The Industrial Bio-Test (IBT) Laboratory scandal in the mid-1970s tarnished the reputation of pesticide testing, and IBT has become the rallying cry for other irresponsible charges against the industry. But the legacy of IBT is becoming history as new tests are completed. At Monsanto, we've strengthened our supervision of outside laboratories and moved a sizable percentage of testing to our own facility. We're proud of our tough standards for testing and the quality of our science.

Our industry also backs a strong, well-funded EPA. It's in the best interest of the manufacturer, the customer and the public that the EPA have the resources it needs to do an intense and thorough evaluation of all pesticide applications for registration. And the agency does a good job under tough conditions. It is expected to provide scientific standards and methods to what are often emotional or political questions. We don't always agree with EPA, and we'll defend our point of view vigorously when scientific questions are debated. But we respect and support its purpose.

Industry's responsibilities don't end after registration or at the point of sale. For example, the National Agricultural Chemicals Association (NACA) is sponsoring an education program for migrant workers who handle pesticides. Spanish-language brochures and radio and television spots give reminders on

Oranges in a Florida orchard

proper handling and hygiene. Some 100,000 brochures have been distributed so far, and dozens of radio and TV stations carry the public-service announcements.

Monsanto, like many other companies, is involved in training programs on proper use of chemicals elsewhere in this country and around the world. And, NACA and individual companies support the National Agricultural Aviation Association in providing programs for training its members in the most modern, effective methods of applying pesticides. The program, called Operation SAFE, has been successful coast-to-coast.

The facts also support the benefits of using pesticides. Some 2,000 species of weeds, 1,000 species of nematodes and 10,000 species of insects compete with humans for food and fiber. While estimates vary, most experts say that without the use of pesticides, food supplies would decrease by 30 percent or more. Romantic notions to the contrary, we cannot return to the pesticide-free days of yesteryear and still provide food at low cost to millions, even billions, of people. As the world population continues to grow, the need to use modern agricultural techniques will increase, not decrease. The United States can produce a good part of that huge requirement, and modern technology can help other nations produce more.

Outside of agriculture, pesticides also provide benefits by protecting our homes from termites and other destructive pests that do billions of dollars of damage yearly. Pesticides also are necessary to provide protection from disease-bearing insects and contaminated water. These products are essential tools of modern life. Like all tools, they must be used correctly and with care, but they provide benefits that raise the quality of living for a growing number of people, worldwide.

The facts also support the view that these benefits are not gained only at the cost of assuming immense risks. Scientists are beginning to reassess the risks of pesticides and other chemicals. That's particularly true in the intensely emotional area of carcinogenicity.

Sir Richard Doll and Richard Peto of Oxford University, who analyzed cancer mortality rates for the Congressional Office of Technology Assessment, reported that the major causes of cancer were tobacco and diet. And by diet they did not mean chemical contaminants, if any, in food. Exposure to materials in the workplace, environment, food additives and industrial products, combined, totaled 8 percent. Constant effort is needed to reduce that percentage, but the facts do temper the myth that we live in a sea of manmade poisons.

Lewis Thomas, M.D., Chancellor of Memorial Sloan-Kettering Cancer Center, says flatly that there is no cancer epidemic. He fears that Americans are becoming a "nation of healthy hypochondriacs, living gingerly and worrying ourselves half to death."

Dr. Bruce Ames of the University of California at Berkeley says that Americans consume 10,000 times more cancer-causing chemicals in their daily diet from natural products than from manmade pesticides. He said, "I think we got off on the wrong track. We're concentrating almost exclusively on little bits of pollution and manmade things and completely ignoring enormous amounts of natural mutagens and carcinogens. I'm starting to question our whole way of thinking."

Dr. Ames is one of the few scientists to take on these issues head-on. He points out that aflatoxin found naturally on peanuts is a far more potent carcinogen in rats compared with EDB, a pesticide sometimes found in trace amounts in grain or flour. Aflatoxin is allowed in peanut butter at 15 parts per billion. Dr. Ames said that the risks "from eating the average peanut butter sandwich come out as more than eating the rare, highly contaminated muffin." And yet all of us should continue to enjoy peanut butter.

Perhaps the most startling and controversial view of cancer is provided by Edith Efron in her new book, *The Apocalyptics: Politics, Science and the Big Cancer Lie.* She challenges the methods used to "protect" Americans from cancer-causing substances. She says that the nation has used a hypocritical double standard in assessing risk. The book is thoughtful and thought-provoking. It raises a number of issues that need to be confronted by scientists and lay people alike.

There is a way to go, however. The publication of *The Apocalyptics* itself provides a commentary on perceived risks from chemicals, the risk not to health, but to reputation by challenging established views. The publisher sent copies for review to 16 distinguished scientists. All thought highly of the book; all refused to allow the use of their names.

The risks from pesticides need to be studied and re-evaluated constantly. But voices like those of Dr. Ames and Edith Efron also need to be heard if we are to put those risks into perspective. Otherwise, we may lose the very real benefits from pesticides while addressing not-so-real risks.

While that is under way, the public will continue to be concerned. Too many charges and too many headlines have ingrained the fear of pesticides into the public's perception. But the time is right to work to reduce those fears with facts. All of us — government, industry and environmental groups — have a responsibility to fulfill, one that can best be undertaken in a spirit of cooperation and mutual respect. It's time to stop shouting at each other and begin to listen—hard. We're ready at Monsanto. Other companies will join. We would welcome the opportunity.

The Pennsylvania school girl who wrote her research paper on "Pesticide Abuse and Pesticide Danger" reflected some of today's thinking. Perhaps for her college thesis she'll write another paper on "The Benefits of Pesticides: A Balanced Perspective." □

Second view next page

An Increasing Public Concern

By Robert L. Metcalf

The judicious use of modern pesticides is an important adjunct to modern agriculture and public health. None of us is eager to return to the standards of the Middle Ages when life had its full share of wormy apples and weevily biscuits, virtually everyone was lousy, and fleas and bedbugs were constant bedtime companions. The discovery of DDT, BHC and 2,4-D during the Second World War gave promise for greatly enhanced agricultural productivity, of banishing such villains as the house fly, the cockroach, the bedbug, and the louse, and of eradicating the scourges of malaria, typhus, and yellow fever.

Yet somehow much of it seems to have gone awry and we are still waiting for the EPA to put it right. As we approach the fiftieth anniversary of the discovery of these miraculous pesticides, there is steadily increasing public concern and mistrust about the hazards. The Council for Environmental Quality in a public survey in 1980 found that the level of public concern about toxic chemical wastes surpasses that for any other environmental problem and that more than 80% of those responding believed the government should screen chemicals for safety before they were marketed and that chemicals known to cause cancer should be controlled.

There is no such thing as an indispensable pesticide. The claims for DDT probably came as close as any; it was registered for use on some 334 crops and agricultural commodities in 1961, yet it was banned by EPA through an administrative order in 1972. Since that time we continue to hear that we can't grow corn without aldrin and heptachlor, we can't grow peaches without DBCP, we can't ranch in the southwest without 2,4,5-T, we can't produce sheep without 1080 predator poison, and we can't grow citrus and papayas without EDB.

These pesticides have all had severe federal regulation and restriction, yet agriculture continues to produce vast surpluses, land is held out of cultivation, and most of us are better fed than ever before. The following examples demonstrate the growing need for careful benefit/risk evaluation and for prompt and decisive regulatory action. They are chosen from the many cases that required action by EPA scientists and administrators and by the Pesticide Science Advisory Panel over the past seven years.

In 1969, the Secretary of Health, Education and Welfare's "Commission on Pesticides and their Relationship to Environmental Health" emphasized the problems of widespread contamination by the persistent organochlorine insecticides. Toxaphene was suggested as requiring close surveillance. With restrictions of the other organochlorines, toxaphene became the most heavily used insecticide in the U.S.

Toxaphene was shown to be a carcinogen in laboratory animals by the National Cancer Institute in 1979, and residues were found to cause crippling bone deformities in fish at part-per-billion levels in water. After toxaphene residues were found to be accumulating in fish of the Great Lakes, there was pressure for its restriction but EPA did not ban the general uses of toxaphene until 1982 and then only after a U.S. Congressman added a cancellation order to a House appropriations bill.

Endrin is another of the "uncontrollable organochlorines" singled out by HEW for regulation in 1969. It is the most toxic of the group, so much so that it was registered as a rodenticide to kill field mice in orchards. Its use as a cotton insecticide caused so many damaging fish kills that its use east of the Mississippi River was finally restricted by EPA in 1981. Intensive agricultural lobbying preserved its registrations to control grasshoppers and cutworms attacking wheat in the Great Basin.

About 260,000 acres of wheat were sprayed with endrin by air in 1981 and partridge, grouse, ducks, and geese became contaminated with endrin residues well above the "safe level" and endangered species such as the bald eagle, peregrine falcon, and whooping crane were threatened. The 20 million migratory waterfowl passing through this area annually have extended endrin contamination to the 17 states of the Western flyway. At present endrin residues are widely distributed in the wildlife of the entire Great Basin ecosystem.

Heptachlor is another insecticide most of whose uses were cancelled in 1978. Curiously, one registration not cancelled was its use on pineapples in the Hawaiian Islands to control ants that upset the biological control of pineapple mealybugs. The results of this regulatory omission were spectacular. Pineapple tops were fed to dairy cattle as "green chop" and their heptachlor residues were concentrated in milk as a more toxic and more persistent chemical, heptachlor epoxide, that is a carcinogen in laboratory animals. Thus heptachlor epoxide residues were transferred to virtually all the inhabitants of the Islands. Mother's milk was found to be contaminated with residues of heptachlor epoxide and infants were ingesting several times the "acceptable daily intake" as determined by the Food and Agriculture Organization and World Health Organization, agencies of the United Nations.

The resulting brouhaha began with finger pointing and accusations by concerned citizens, the milk and pineapple industries, the State Department of Public Health, and the University of Hawaii. The issue is now in the courts.

Mirex, another persistent organochlorine, destroyed colonies of the imported fire ant when applied as a bait at miniscule doses. The Secretary of Agriculture in 1971 hailed mirex as the perfect pesticide: "It has no harmful effect on people, domestic animals, fish, wildlife or even bees, and it leaves no residue in milk, meat or crops." Armed with mirex the U.S. Department of Agriculture planned a massive eradication campaign against the fire ant to cover more than 100 million acres.

Mirex, as predictable from its chemical structure, is very persistent and biomagnified through food chains. Despite the low dosage applied, residues in the parts per million range were found in birds, fish, shrimp, and crab and in the fat of humans throughout treated areas. Mirex was determined to be a carcinogen by the National Cancer Institute in 1976, and after numerous skirmishes in the courts, EPA terminated the production and application of mirex in 1978.

In 1976 a new rodenticide, pyriminyl, was widely marketed in the U.S. for the household control of rats and mice. It was advertised as almost a specific killer for rodents with very low hazard to man and higher animals. However, the rodenticide was marketed as a 0.5% active ingredient in 15 gram packets of peanut-flavored confection. Predictably,

Field workers [illegible] and pack head lettuce for market near Salinas, California.

some of these were eaten and at least 30 persons, many of them children, were afflicted with severe and irreversible diabetes and damage to their nervous systems.

Belatedly, EPA scientists learned that pyriminyl had been test-marketed in South Korea as a rodenticide in 1975 and 251 cases of human poisoning with some fatalities were reported. With this evidence EPA was able to persuade the manufacturer to withdraw pyriminyl from the market in 1980.

Dibromochloropropane or DBCP was introduced about 1955 to control the soil-inhabiting nematodes that attack the roots of citrus, peach, grape, pineapple and annual root crops. It was particularly effective because it was not unduly hazardous to growing crops and it was thought to decompose in edible produce to harmless inorganic bromide.

Toxicological studies published in 1961 showed conclusively that exposure to DBCP caused severe atrophy and degeneration of the testes of mice, rats, and rabbits. These results were not communicated to factory workers until a group of them became concerned about their inability to father children. A private consultant hired by their union established that their infertility was due to exposure to DBCP in the workplace. A study by the National Cancer Institute in 1973 showed that both DBCP and the related nematocide EDB were active carcinogens producing stomach cancers in rats and mice, and warned of possible health hazards to humans.

As a result DBCP was targeted in 1976 as a candidate for re-evaluation and regulation. EPA demonstrated in a massive study of factory and farm workers that DBCP exposure was quantitatively related to decreased sperm counts. After exhaustive studies of benefit/risk and four public hearings, EPA finally suspended all uses of DBCP in 1981.

The preceding examples characterize pesticides whose benefits cannot match the risks they pose to human health and to the quality of the environment. Their demise was predictable. The entire philosophy of how we use pesticides in modern agricultural production is open to serious question.

As long ago as 1969, the Secretary of Health, Education and Welfare's Commission on Pesticides and Their Relationship to Environmental Health emphasized the problems of the widespread contamination of air, water, soil, food, and human bodies by persistent insecticides and pointed out "the absurdity of a situation in which 200 million Americans are undergoing lifelong exposure, yet our knowledge of what is happening is at best fragmentary." This absurdity is compounded many times today as the U.S. applies about 45 percent of all pesticide production to only 7 percent of the world's cultivated land.

The major difficulty with pesticides is that they are nearly all highly reactive chemicals that kill living organisms by reacting with some vital component of living tissue. Almost by definition they lack selectivity and their impact upon nontarget organisms such as fish, birds, bees, beneficial parasites, endangered species and even man can be devastating.

Consider the organophosphate parathions introduced as insecticides in 1946. Parathion poisoning is the major cause of the estimated 500,000 human illnesses and 20,000 deaths that occur annually from the use of pesticides, according to estimates of the World Health Organization. Yet the parathions are still produced and used worldwide at the rate of several hundred million pounds per year in appalling disregard for human welfare. There are dozens of effective and much safer substitutes.

The lack of selectivity of pesticides and their widespread overuse are causing immense problems to agriculture itself. A major consequence is the "natural selection" of resistant races of insects, mites, fungi, and even rodents and weeds that are no longer susceptible. This process has gone so far today that most insect pests exhibit multiple resistance not only to a few of the older organochlorines but also to the newer organophosphorus and carbamate insecticides. Some very important insects such as the house fly, the cotton bollworm, the Colorado potato beetle and the diamond-back cabbage worm are resistant to all available types of insecticides and are virtually uncontrollable.

The existence of these "monster" insect pests, many of them unimportant until their natural enemies were decimated by the widespread use of broad spectrum insecticides — together with the environmental contamination and human health effects previously mentioned — has brought about an acute need for a new philosophy and methodology of pest control. This is called Integrated Pest Management and it seeks to combine all available techniques of pest suppression, crop rotations, resistant crop varieties, encouragement of natural enemies and diseases, together with the selective and judicious use of pesticides into a sound ecological framework.

Integrated Pest Management (IPM) has been endorsed by the USDA, by EPA, by the Council on Environmental Quality and by such United Nations agencies as the Food and Agriculture Organization and the World Health Organization. A central premise of IPM is to generally relegate the use of pesticides to emergency use when all else fails and to spray only when necessary.

Repeated successes with IPM programs in pest control all over the world have demonstrated that this ecological approach to pest control can reduce pesticide applications by 50 to 95% or more. This achievement promises to be one that all of us — farmers, conservationists, scientists, and concerned citizens alike — can live with. Additionally, IPM practices can materially reduce crop-production costs and prolong the useful life of present-day pesticides by decreasing the rate of selection of resistant species. □

Insuring Safety in Genetic Engineering

Biotechnology refers to a new applied science, now in its infant stages, which may soon revolutionize American agriculture. The term could technically apply to any manipulation of living organisms for commercial purposes, including selective livestock breeding, cross pollination of fruit trees, controlled fermentation with yeast, or cultivating antibiotic-producing molds.

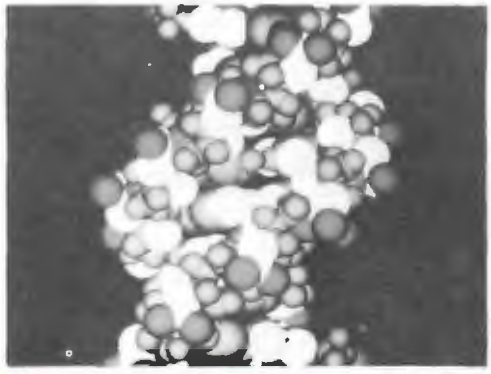
Now a new kind of biological manipulation called "genetic engineering," which was first experimentally developed within the last ten years, is nearly ready to be applied to commercial ends. Traditional forms of biotechnology have been used on a small scale, with small numbers of organisms, and the ecological impact has in most cases been limited and local. Although the new biotechnology is conducted on an even smaller, molecular level, its impact on the ecology may be large, or even global in scale. Scientists are simply not certain about the potential ecological consequences of releasing genetically engineered, non-natural organisms into the open environment.

Recent advances in our ability to synthesize, analyze, transpose, and transport the heritable genetic material DNA in and between organisms gave rise in the mid-1970's to the development of genetic engineering, more properly called "recombinant DNA technology." Its first practical use was in manipulating cell cultures to produce larger quantities of medically useful substances such as insulin and hormones. Early proposals for other uses included the engineering of oil-spill consuming bacteria, and special microbes that could quickly replenish lost nitrogen in cultivated soil.

Frost-protection Microbe

Scientists at the University of California at Berkeley have succeeded in engineering a microbe that helps inhibit frost formation on certain frost-sensitive crops. This invention is especially important because it may be the first intentional outdoor release of a genetically engineered microbe.

The principle under which this new frost-protection microbe functions is quite simple. Frost is formed when moisture in air colder than the freezing point crystallizes around a particle or on a surface. Certain bacteria, particularly *Pseudomonas* and *Erwinia,* which live in the crevices on plant surfaces, have a unique capacity to precipitate the crystallization process very efficiently. Although frost may be precipitated by



A computer model of a molecule of DNA, the genetic material that is key in biotechnology, a new science that could help in crop protection.

any number of materials, including atmospheric dust and manmade materials such as glass, it appears that the *Pseudomonas* and *Erwinia* bacteria are largely responsible for the formation of frost on many plants, including grasses, shrubs, and trees, both wild and cultivated. These bacteria, called ice nucleation active (INA+) bacteria, therefore seem to be indirectly responsible for the extensive frost damage done to citrus and other crops when the weather turns unusually cold out of season.

The Berkeley scientists developed a mutant form of the ice nucleation bacterium which does not have the capacity to precipitate frost, but which can successfully compete with and displace its natural counterpart by occupying the same ecological niche. These scientists have cultured the mutant bacterium, called (INA-), and after field testing, hope to market it for application to agricultural fields to protect crops against frost damage.

Because the genetically engineered INA- bacterium is designed to mitigate the sometimes damaging INA+ bacterium, EPA considers it a pesticide under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). Under this statute, all pesticides marketed in the United States must be registered with EPA, and all applications for registration must be supported by data demonstrating that the proposed product's use will not cause "unreasonable adverse effects" to man, other non-target organisms, or the environment. These health and safety data, which may include laboratory and field testing of acute and chronic toxicity, mobility, degradation, and accumulation, toxicity to wildlife, and ecological effects, are generated by the applicant, usually the pesticide's commercial producer.

Ecological Risks?

The Office of Recombinant DNA Activities in the National Institutes of Health (NIH), which has overseen genetic engineering in the U.S. since 1974, has conducted an in-depth evaluation of the INA- project. After some scientific debate, they unanimously concluded that the intentional release of INA- bacteria did not appear to pose a risk to human health. However, the bacteria's potential hazard to human health is not the primary concern.

While frost apparently forms by many processes, and ice nucleation active bacteria are only known to be responsible for frost formation on certain plants under certain conditions, there is speculative concern about the potential ecological consequences if the INA- bacteria were so successfully competitive that they eliminated their natural, frost-promoting counterparts in particular ecosystems. Consequences of this might include the shifting of populations of plants with varying abilities to cope with frost and resulting effects on the species that depend on these plants for food. Naturally occurring INA+ bacteria are also carried by wind currents into the upper atmosphere, and may partially influence the global climate. Another possible concern therefore is the potential long-range effects that INA- bacteria may have on weather patterns.

These sorts of environmental safety questions will have to be addressed by the applicant before EPA could give permission to market the mutant bacteria.

Meanwhile, U.S. District Court Judge John J. Sirica has halted the experiment designed to test the frost-preventing genes in a potato field. The judge granted a temporary injunction to stop a University of California experiment and all other experiments that "deliberately release" gene-engineered organisms into the environment. The court was to conduct a full hearing later on whether the federal government violated the law in approving the experiments without fully assessing environmental impact.

Jeremy Rifkin, author and social activist, and other plaintiffs in the suit charge that the NIH, in approving the gene experiments, failed to consider the work's possible impact on the environment and therefore failed to comply with the National Environmental Policy Act, which requires such assessments before "major federal action." The University of California is appealing Judge Sirica's decision. □

Farming Without Chemicals

By Dick and Sharon Thompson

Dick Thompson inspects one of the hay fields on his farm

BOONE, Iowa — When we began farming the Thompson family's home place back in 1957, Dick put into practice all the lessons he'd learned at Iowa State University while earning a master's degree in animal husbandry.

Fences were taken out between fields. Concrete was poured in livestock lots to confine cattle and hogs. All 300 acres were planted to corn. Planting was done before May 5 on ground that had been plowed the previous fall and left exposed to wind and water erosion all winter.

We used tremendous amounts of fertilizers, herbicides and insecticides. But there were problems, more and more of them. When applying anhydrous ammonia, Dick suffered from severe headaches from the fumes that entered the tractor cab. His hands were burned from contact with herbicides. He could taste the pesticides in his mouth when broadcasting them during corn planting.

We were expanding way too fast. It was more than we could handle. Enough was never enough. Quicker was never quick enough. Then the animals began telling us that something was wrong, too. Sickness became the rule, rather than the exception. Even though rations were loaded with antibiotics, our pigs would still scour. In addition to the usual cattle diseases, such as coccidiosis and pneumonia, there were exotic maladies like ulcerated tongues.

Our corn yields ranged from 110 to 130 bushels per acre. If we could have grown continuous 150-bushel corn, maybe we'd still be farming that way today. But there was a problem with our spiritual life at the same time. Since one of our deepest beliefs is that problems can be turned into opportunities, we began looking for new ideas.

We attended a natural farming meeting. A farmer there said if you're growing continuous corn and using Atrazine for weeds and Diazinon for bugs, then you're heading down a blind alley. Hearing that, Dick later said, was like getting hit over the head with a two-by-four.

In 1967, we stopped using chemicals cold turkey, changed to a balanced rotation of oats/legumes and grasses-hay-corn-soybeans-corn. This is an old, reliable rotation for Midwestern farmers, but an excellent one because it includes growing a legume three out of every five years. The legume's solid ground cover helps minimize erosion, which is now down to about 1 ton per acre on part of our farm and about 4 tons per acre soil loss. Our soil loss figures do not include the use of interseeding legumes or cover crops, which makes us think we need a new soil loss equation. The organic farmer is the best friend the soil conservation people have.

This year, eight out of our nine fields were green with cover crops. We like to say we've been in the PIK (Payment-In-Kind) program for many years, without costing the taxpayer. If more farmers adopted a rotation that included a legume, we'd get rid of the surplus of feed grains that has kept cash grain farmers from making any money, except for a few boom years in the early '70s.

Despite the sudden withdrawal of chemicals, our yields did not plunge. Oats yielded 85 bushels per acre, soybeans 40 to 45 bushels, and corn 100 to 125. Some of our corn fields following meadow have produced 145 bushels.

This system has worked well for us. Presently, we operate our farm on a cash-flow basis with no borrowed money. Despite that, we don't urge other farmers to quit chemicals all at once, like we did. They should take one field at a time, and experiment. We know of farmers whose corn yields have dropped 60 bushels per acre when chemical fertilizers were suddenly discontinued. They were in a corn-soybeans rotation where no livestock manure had been used before or after they quit chemical fertilizers. The best way we can explain this is that if all the nutrients are spoon-fed, the soil bacteria get lazy, instead of working. The question is, how many Monday mornings will it take on some land before the soil life goes back to work?

For cash-cropping farmers who wish to farm organically without livestock, we suggest an oats/clover-soybeans-corn rotation. We have used this same rotation on rented land and produced 100-bushel corn. Using chicken manure the third year before corn raised those yields to 120 bushels.

On our 80 home acres, we practice a corn-soybeans-oats-meadow-meadow-meadow rotation. Half that land is always in meadow. Corn following meadow has given us our highest yields of 145 bushels per acre. We rotate 80 grazing cattle and their calves between two 20-acre pastures. Our seeding combination for hay ground and meadow is 3 pounds each of alfalfa and orchard grass, 2 pounds of red clover and timothy and 1 pound each of alsike clover and sweet clover.

Cash-grain farmers might groan at flat, black Iowa ground valued at $2,500 an acre being used for meadow. But we've been through trying to calve in confined lots. We want our calves to start life on the green grass, with plenty of fresh air. Besides, we like the idea of letting the cows do all the fertilizing.

Manure from our 90-sow,

(The Thompsons, who have a farm in Boone, are contributing editors of *The New Farm*, a magazine concerning regenerative agriculture, published in Emmaus, Pa.)

farrow-to-finish operation and what our cattle leave around the barn is hauled to the edge of a field and put in windrows for composting. We incorporate the compost with an offset disk in the fall in fields going into corn. For a winter cover crop, we use rye.

Since we haven't used herbicides since 1967, we couldn't very well follow the standard no-till methods so popular today. Instead, in corn and soybeans, we use ridge-tillage that relies completely on cultivation for weed control. By not buying fertilizer or herbicides, we save about $90 an acre from the start. We treat early weeds as an asset, rather than a liability, especially the legumes that come back from hay crops the year before.

To us, organic involves a different way of thinking, an inner feeling, that then changes the way you act toward the environment and your fellow man. Perhaps the word regenerative better explains our feelings. The problem may be in the land, but the cause is in the heart of man. Until there is a regeneration or change in the hearts of people toward the land, all the good intentions and government programs won't accomplish a thing.

But is this way of farming what most people would consider profitable? To best answer that question, we should perhaps quote from Dick's Congressional testimony last fall in support of the Agricultural Productivity Act. U.S. Rep. George W. Brown, Chairman of the House Subcommittee on Department Operations, Research and Foreign Agriculture, was a bit puzzled by our statement about operating on cash flow.

Brown: You mean you are independently wealthy and you don't have to go to the bank, sir?

Dick: I didn't quite say it that way. I said we are working on cash flow. We have enough income coming to pay our bills and we are updating our machinery without going to the bank.

Now, I know what the other side is like. Prior to that, when I was trying to expand, buying feeder cattle and feeder pigs, I was a good friend of the bankers. If we hadn't made the change in 1967... maybe our farm would be for sale now by the bank.

Brown: That does give a fairly good picture of financial soundness .... But it also doesn't tell me whether you are living in voluntary poverty or whether you are providing yourself a good standard of living off of that cash flow.

Dick: I try to avoid this kind of situation, but I will say this: We have just purchased two new John Deere tractors and they are paid for. Does that help? □

Safer Use of Rodent Baits

EPA is exploring ways to insure safe use of rodenticides through better bait protection.

To attract rodents, many registered baits have an oat, wheat, or corn base, with added sugar. Some even have special flavors such as fish, meat, cheese, or apple.

Unfortunately, the same poison that attracts rodents also attracts children and "non-target animals" like pets, farm animals, wild animals, and birds. The substances in bait that are toxic to rodents are also generally toxic to other vertebrate animals, including people.

First Step: Labels

About 20 years ago, the U.S. Department of Agriculture's Pesticide Regulation Division—the predecessor of EPA's Office of Pesticide Programs—took the first step towards bait protection. It required that labels for rat and mouse baits bear a statement such as, "Treated baits should be placed in locations not accessible to children, pets, wildlife and domestic animals, or in tamper-proof bait boxes." This language, which began appearing on labels in 1966, was retained by EPA when it assumed responsibility for regulation of pesticides.

In 1974, in response to requests for clarification of the language, EPA defined the term, "tamper-proof bait box." In 1976, the agency developed proposed criteria for tamper-proof bait boxes that included such characteristics as weather resistance, capability of being securely anchored, and use of baffles, mazes, small entrances, or other devices that would let target animals in but keep larger, non-target animals out.

The proposed criteria provoked criticism that the required stations were technically impossible to build; that tamper-proof bait boxes would be unavailable, uneconomical, and ineffective; and that the term "tamper-resistant" should be substituted for "tamper-proof."

EPA began receiving, in response to the criteria, an increasing number of requests for assessment of bait station

A child tries unsuccessfully to reach the rear compartment of a bait box, where poisonous bait would be placed to attract rodents. The box, whose lid has been removed for illustration purposes, shows one way to design a device that protects children from pesticide-treated bait.

designs. Laboratory tests conducted by EPA showed substantial differences among the samples submitted. Some designs impeded eating of bait by the rodents. Some units were more resistant than others to entry by ground-feeding birds. Some were more easily damaged than others by raccoons, the weather, even by target rats and mice. When EPA evaluated some of the stations for accessibility of bait to people, it again found wide differences among the units tested.

While discussions about the proposed criteria continued, so did accidental poisonings. The National Clearinghouse for Poison Control Centers, part of the U.S. Department of Health and Human Services, collected more than 1,300 reports of human rodenticide incidents per year for 1979, 1980, and 1981. More than 80 percent of these involved children five years old or younger. About 10 percent of the incidents were classified as "toxic." The Clearinghouse estimates that these reports represent only two to ten percent of the total number of cases.

National figures on bait poisonings of animals other than rodents are not available. But rodenticide accidents involving pets are not uncommon. In the first quarter of 1983 alone, the Animal Poison Control Center Toxicology Hotline at the University of Illinois received more than 300 calls about rodenticides, mostly concerning actual or potential hazards to dogs.

Course for Future Action

Concerned about safe use of rodenticides, EPA in the summer of 1983 issued a Pesticide Regulatory Notice (PR 83-5) "to inform all registrants, applicants, and other interested persons...of recent developments in the agency's assessment of rodenticide bait boxes and statements on rodenticide labels regarding the use of bait boxes." The notice listed commercially available bait stations considered to provide "adequate protection when used properly." The notice also outlined a course for future EPA action.

This mainly involves two activities: reviewing existing standards for child protection to determine if any are applicable to the bait-box situation, and holding public hearings on bait boxes. The hearings are intended to gather information on use of bait boxes, attitudes regarding EPA's proposed criteria, and ideas for developing bait-box standards and test protocols.

The first hearing session took place November 4, 1983, in Virginia; the second, March 5, 1984, in California. EPA expects to issue a report of findings from the hearings in September, 1984.

Comments at the first hearing pointed to several issues which must be addressed before EPA, the pesticide industry, and bait users can be sure of universal good practice in safe use of rodenticide baits. One issue involves communicating the need for safe use to all potential users.

Label directions for using bait boxes do not differentiate between commercial applicators and "ordinary citizens." However, while it is fairly easy to reach commercial applicators with news about label directions through pest-control trade associations, trade publications, and certification courses, it isn't so easy to reach private citizens who buy rodent baits in drug stores and supermarkets and use them in their homes and yards.

Since private users may account for a much greater total volume of rodenticide use, with much of this use in and around the home, informing the homeowner market of the need for bait protection is critical.

Another issue highlighted at the first public hearing was the need for a definition of "accessible." As mentioned above, labels state that baits should be placed in locations not accessible to children and pets. In some locations, such as industrial areas, warehouses, and food production and grain storage facilities, where children and pets are rarely present, accessibility is of small concern. But children, pets, and wildlife may be present in other locations, particularly outdoors, and the issue of accessibility then becomes critical. The problem, cited in numerous cases involving alleged rodenticide misuse, is that regulatory agents may not agree with pest control operators' conclusions that particular bait placements were inaccessible to children and non-target animals.

Each year in the United States, tons of toxic baits are used to control rats and mice which otherwise would destroy food, damage buildings, and pose a public health threat. Through its proposed regulation, EPA is trying to ensure protection of public safety in the use of these rodenticides. □

Options for EPA

An Interview with Howard Messner

In this interview, EPA Journal asks Howard Messner about the recent recommendations by a panel of the National Academy of Public Administration regarding management at EPA. Messner is EPA Assistant Administrator for Administration and Resources Management.

Q How did the study get started?

A The idea originated when Bill Ruckelshaus and Al Alm asked me to return to EPA to help restore the agency to its most credible level and strengthen its effectiveness. I told them that if we were going to do this quickly it would be very helpful if we had some outside advice.

I suggested that we approach the National Academy of Public Administration. Congressionally chartered like the National Academy of Sciences, the Academy was founded in 1967 to serve as a trusted source of advice and counsel to government. Its members are elected by their peers based on distinguished public service and contribute their time to help make the government run better.

I proposed we approach these people and ask them if they would put together a panel to look at the agency and give us their best advice about where we are right now and where we should go in the future. It wouldn't be so much looking back on who did what to whom. We were primarily interested in the best course for building lasting management systems, especially a strong personnel system and an accurate, responsive budget system.

That was the origin and the panel was put together shortly after that.

Q How was the panel put together?

A The Academy assembled a ten member panel with a tight level of management experience in the public and private sector. The Academy picked about half the panel from its membership, including the Chairman, Frank Carlucci. Frank had been formerly Deputy Secretary of Defense and had a lot of experience running large agencies. Another Academy member selected, John Gardner, had been Secretary of Health, Education and Welfare.

But they also went outside their own membership to get the right skills needed for the job. For example, they selected Gerald McManis, formerly with the government but now President of McManis Associates. And Simon Lazarus, a former Associate Director for White House Policy Staff who is currently a law partner in Powell, Goldstein, Frazer & Murphy.

The Academy not only discussed with us who they proposed to select but asked for our suggestions. For example, because EPA is evolving towards greater delegation of authority to states, we suggested that it would be helpful to include a state environmental director. Victoria Tschinkel, from Florida, was put on the panel.

As I mentioned, we were especially interested in an assessment of our management lifeline systems, the personnel and budgeting systems. The Academy chose two experts in the field: Ersa Posten, former member of the Merit Systems Protection Board and Dale McOmber, former Assistant Director for Budget Review of the Office of Management and Budget.

The Academy tried to make sure the panel met the expectations of the agency and the group they selected was just outstanding. It also included Bob Fri, former Deputy Administrator of EPA, and two former White House Personnel Chiefs in previous administrations, Bob Merriam and Bill Walker.

The staff director on the personnel management side of the study was Betty Bolden, Deputy Assistant Secretary of the Department of Labor, and Eldon D. Taylor, former Inspector General of the National Aeronautics and Space Administration, was staff director for the review of EPA's budget process. Both were excellent choices.

Q What was the panel trying to accomplish?

A They were trying to take a snapshot of where EPA is after 13 years and lay

Frank Carlucci (left), chairman of a National Academy of Public Administration panel that reviewed EPA management practices, presents Administrator William D. Ruckelshaus with a report by the panel. Carlucci, a former Deputy Secretary of Defense, is the Sears World Trade chairman.

some kind of a path to the future, pinpoint the things they think that should be emphasized in the agency in the next decade. In particular, they were to assess the morale of the employees, learn how the institution sees itself and consider how to improve that image. It was a very broad charter.

Q Did they interview EPA employees as part of the study?

A Panel members and staff probably met with 500 to 1,000 employees face to face in headquarters and the regions and by the time you add in questionnaires and other ways the panels solicited advice, several thousand of our employees were directly involved.

Q What did they find out in that process about the attitudes of EPA employees toward their responsibilities and toward the agency?

A They found out that EPA is still very much alive. It has a spirited work force. They found out that the employees who work here want to stay; that they are very dedicated people; that they are willing to invest in their own future with us. They found out that the employees are highly opinionated, very motivated people, very much involved in the issues of the environment both in the workplace and outside of it, and are a very intelligent work force.

They found that there was a sense of hopefulness in the work force, that the EPA had gone through its early years successfully and that it was about to rebound and do a very good job in the future. There was a concern among employees that the agency be managed in such a way as to give them a professional future. They didn't want the place to just sort of circle or become apathetic. It is a very intense labor force.

Q Did the panel conclude that the agency has essentially recovered from the low employee morale that was experienced for a period of time in the last several years?

A Yes, and they say so in their report. The employees have felt that they've had a new burst of energy and the Academy survey found that to be a very encouraging sign for the future.

But the report also points out that long-term gains beyond the initial improvement that we've seen in these 12 months depend on a lot of factors such as long-term commitments to the personnel system by management and the participation of the employees in their own job futures.

Q Then one of the Academy's concerns was how morale can be established over the long term?

A Yes, and how you get the employees more involved in the personnel system so that it's theirs and not something just laid on top of them or manipulated by a few people. And the Academy report made recommendations to achieve that.

Q What steps did the panel propose to insure continued high quality performance by EPA employees?

A They suggested in an over-arching way that we create a new Office of Human Resources Management—that we create separate from the ongoing personnel operations which every agency has to have, a group of people who would have the time to look at the future of the work force, how it's used, how it's trained, how it's recruited, how it's moved around.

They suggested that we put more emphasis on planning for our people over a long period of time, because they found that our employees want to stay here a long time. They suggested a process and jobs that would keep employees involved for years and that's the basic purpose of the new Office of Human Resources Management.

Q How will the average EPA employee be affected by the changes which the panel is proposing?

A The panel was very complimentary of the employees. They argued for more simplicity in the management system so that the employees can take on more responsibilities. They think that there is a little too much red tape here, that we have a lot of rules and regulations that we create, and that we have a lot that have been laid on us by other agencies of the government or by the Congress for that matter; and they argue that the employees here, if treated with respect, can be very responsible and are very imaginative in problemsolving. They would like to see, particularly, the emphasis placed on freedom to manage.

Q What did the study learn about the agency's program managers?

A The panel found that the managers have concerns about the possible arbitrariness in decision-making in the personnel system.

Managers have to feel that they are a part of something fair and the report emphasizes that fairness will come out of participation. The managers in this agency want to participate in the major decisions that affect future careers. The panel argued that there should be strong advisory committee structures built from the employees and the managers to the new Office of Human Resources Management. It suggested that we seek assistance from other federal leadership, people who have an interest in the environment, and from people from state governments who understand the agency and who could help us build a good, strong and fair personnel system.

I think the panel was reflecting a feeling that managers here want a role in the future of EPA, and they want to be assured that role will be treated with respect and be decided on fairly.

Q Did the study propose steps to improve EPA's budget-making process?

A It did. They discussed the efforts we are now making to link the budget with the accomplishments system and other management processes of the agency. They suggested that if we had more flexibility we would run a better budgeting and management process.

They had a number of insightful remarks about the research and development budget, putting emphasis on simplifying what they saw as a very complicated budgeting system. At the same time, I think they felt that our budget process as a whole was healthy, allowing participation by a lot of different people.

One of their recommendations that we are following up very vigorously is to allow regional managers to participate more fully in budget decisionmaking.

All in all, we got pretty good marks on the budget process.

Q Did the study recommend any steps to eliminate the overlap between the laws EPA administers?

A Yes. They agreed with Bill Ruckelshaus that it's a very difficult agency to manage. It has no coherent legislative base, only a collection of complex and sometimes conflicting statutes to administer. And those laws are always undergoing changes as our knowledge of the environment expands and as federal, state and local governments adapt their laws and institutions to this expanding knowledge base.

The panel suggested that we work towards a single comprehensive environmental law. We're already doing a review of our statutes and a great deal of authority is up for renewal. It's an area to which a lot of future thought will be given.

Q Are there any particular positions in the agency that the report recommended not be presidentially appointed any more?

A The panel had a long debate about the number of presidential appointees in this agency. I want to put that debate in context by pointing out that among the members of the Academy panel were White House personnel directors for previous presidents — William Walker for President Ford and Robert Merriam for President Eisenhower. So, we really had some professional thinking from all spectrums of political thought and expertise. The panel felt that 13 presidential appointees, Senate confirmed, is a fairly large number for an agency of this size. They concluded, however, that the controversial issues that this agency deals with make accountability to the Congress and the President that presidential appointees have a desirable thing.

They suggested that two of the jobs should be looked at very carefully for modification. The first was the Assistant Administrator for Research and Development. They argued that perhaps in order to bring some stability to the long-term needs of research the position should have a five- or six-year term.

The second position they looked at was my own. They argued that the Assistant Administrator for Administration and Resources Management should be a career position because it could be a point of continuity and stability for the agency.

We are going to think about their suggestions. There are some pluses and minuses to the ideas and we'll have to consider them. The panel also suggested that our deputy regional administrator positions should clearly be reserved for career officers. We agree with that very much. The deputy regional administrative jobs have been traditionally career and should stay that way.

Q The panel made some special recommendations regarding R & D in the Agency. What were they?

A They discussed primarily the research management system and how it can be made more easily understood and more effective and less cumbersome. They also had a number of structural concerns in the R&D area and I know that Assistant Administrator Bernard Goldstein will look at these with great care.

Q Would you describe the overall changes the panel proposed as requiring a major reworking of management at EPA?

A No, it isn't so much a reworking of management. It's rather a reinvigorating of management, suggesting a set of principles that we want to install here that the panel saw as clearly helping us over the long run. They are the principles of professionalism and fairness in decisionmaking.

Q Would you say that EPA has a tougher management job than other agencies?

A I have been in seven federal agencies and my work in the Office of Management and Budget as well as the Congressional Budget Office acquainted me with a lot of federal agencies. Management at EPA is significantly more difficult than almost any agency I've worked in because it combines a very complicated regulatory mission with a very sophisticated research mission and an extremely complicated set of ideas that we're trying to deal with in environmental issues.

So it isn't a surprise to me that this agency would go through a long period of judgment and concern. Some of the past months seem to be better than others but by and large for 13 years EPA has been on a course which I think will ultimately be very satisfying to the country.

Q Given the tough job EPA has, how much improvement can be expected from the panel's recommendations?

A It depends how believable they are. This is an agency made up of individualistically minded people who are very skeptical about whether change in this agency can be brought about even though they themselves bring about change in a public way every day. What we have to do is put the recommendations of the National Academy in front of the employees along with concrete ways in which those recommendations can be made to happen. I think that if we get the support of the employees and their active participation in carrying out this set of recommendations, and with Bill Ruckelshaus's follow-up, the steps proposed by the panel will become a very important part of the agency's system.

Q Did the study suggest that EPA needs to become more mature, or does it still need to be feisty, with the experimentation that characterizes a new agency?

A A good question. It is feisty. That's a fact. It is very much like a teenager; in fact, numerically it is a teenager. It's 13, almost 14 years old.

At moments it acts with great insight and maturity and at other moments it kicks you in the pants. We still have some growing pains ahead of us but I think our assets are among the finest in the federal government and will do very well.

Q Does EPA already have management changes under way to help it become more efficient?

A We have done a number of things well in this year alone. We have worked out a very good management system within the agency. Our regions are healthy and strong and getting stronger. We turned over 60 percent of the new resources we won from Congress in the budget amendment last year to the regions. We have a deputy administrator who is an experienced professional manager and very dedicated environmentalist. I think we are in pretty good shape.

Q Is there any additional comment you would like to make?

A It is laudable and encouraging that people of the caliber of John Gardner, Frank Carlucci, Robert Merriam, and other members of this panel would take their time to help this agency. I find it very assuring. John Gardner said that this impartial panel will be our friend inside and outside the agency. We are going to take John at his word and keep that kind of person involved. Based on my experience with the panel, I want to share with the employees my sense that we are not alone in caring about the environment. □

Agency Establishes New Human Resources Office

EPA Administrator William D. Ruckelshaus announced the establishment of the Office of Human Resources Management (OHRM) to ensure that EPA has employees with the right skills in the right positions to carry out its mission in the future.

The new office, to be staffed by 30 agency employees selected from the personnel, management and information science fields, is expected to significantly change EPA's recruitment strategies, career development programs and employment policies, Ruckelshaus added.

OHRM is charged with the systematic planning and implementation of workforce strategies that will affect how agency managers supervise and how employees plan their careers, the Administrator said. The office will work with the environmental community in staffing exchanges to make sure that competent people are available to solve environmental problems at all levels of government.

"EPA is part of a network of people who work together to protect the environment," Ruckelshaus said. "We must knit together staffs and organizations in the environmental community that can combine their professional talents and scientific knowledge to face environmental challenges."

EPA is creating the office in response to a series of recommendations from a National Academy of Public Administration (NAPA) panel, which proposed that EPA change its personnel management function to emphasize human resource development.

Former Common Cause Chairman John Gardner and Sears World Trade Chairman Frank Carlucci, two members of the panel, presented their findings to Ruckelshaus shortly before the Administrator swore in Kirke Harper as OHRM's first director. Harper has been serving as EPA's Director of Administration.

Gardner praised Ruckelshaus' "swift action" in implementing the human resources initiative, saying, "parochial interest must be put aside if we are to create an environmental corps that is competent, resilient, and effective. This office will improve this country's capacity to manage its environmental program for years to come."

Ruckelshaus also announced that EPA will be establishing two outside advisory committees to OHRM, one composed of members of the NAPA panel and the other of federal, state and local colleagues. □

Appointments, Awards at EPA


Carolyn M. Clinton


Dr. William Brungs


Ronald Brand


Gerald Emison


Edward Klein


Edwin Tinsworth

Carolyn M. Clinton has been appointed Associate Administrator for Regional Operations by EPA Administrator William D. Ruckelshaus.

Ms. Clinton succeeds Samuel A. Schulhof who is leaving government service to assume the position of vice-president for Administration at the Foundation for Applied Science and Technology (FAST) in Pittsburgh.

Since June 1983, Ms. Clinton has served as a special assistant to EPA Deputy Administrator Alvin L. Alm. Before joining EPA, she was on the staff of the Harvard Business School.

Prior to that, she spent five years with Gulf Oil Corp. at Gulf Management Institute.

From 1972 to 1977, Ms. Clinton served in a variety of management, research, and editorial positions with Education Development Center in Newton, Mass. Her work there was devoted to developing and implementing a major education project for the National Science Foundation.

Ms. Clinton also worked for several years in public health research and experimental social psychology research.

A native of Attleboro, Mass., she received her bachelor's degree in 1969 from Tufts University's Jackson College in Medford, Mass.

Several other appointments have been recently made at EPA. They include a Laboratory Director, three Office Directors and one Deputy Office Director, a Deputy General Counsel, and a Division Chief. In addition, employees in Ann Arbor, Mich. and in New York, N.Y. have been honored with special awards for their work.

William Brungs is the new director of EPA's Environmental Research Laboratory in Narragansett, R. I. He had filled this position in an acting capacity for a year and a half and, prior to that, was the lab's Deputy Director. The Narragansett lab studies effects of toxic chemicals and ocean dumping on marine and estuarine ecosystems.

From 1971 to 1980, Brungs worked at the agency's Environmental Research Laboratory in Duluth, Minn., a freshwater research laboratory. As that lab's Technical Assistance Director, he had principal responsibility for determining agency research needs to which the lab could contribute. He also was involved in developing programs for determining water quality criteria for aquatic life. Brungs has also worked as a research aquatic biologist for the Federal Water Pollution Control Administration and the U.S. Public Health Service in Cincinnati, Ohio.

Brungs holds bachelor's, master's, and doctorate degrees, all from Ohio State University. In 1977 he received EPA's Silver Medal for Superior Service.

Ronald Brand has been named Director of the Office of Management Systems and Evaluation in the Office of Policy, Planning and Evaluation. His responsibilities will include evaluating EPA programs and directing the agency's strategic planning and management systems and efforts to manage for environmental results. Brand had been a Special Assistant to EPA Deputy Administrator Al Alm.

Brand joined EPA in 1978 as Branch Chief of the Program Evaluation Division. He later became Division Director, and then Deputy to the Assistant Administrator for Policy.

Prior to his EPA service, Brand was a private consultant in health management in Indiana. He has served in the U.S. Department of Health, Education and Welfare as Deputy Assistant Secretary for Management. He also worked for the U.S. Department of Defense and for the State of New York.

Brand holds a bachelor's degree from New York University. He also was a National Institute of Public Affairs Fellow at Princeton University.

Gerald Emison is the new Director of the Office of Air Quality Planning and Standards, part of the Office of Air and Radiation. He had previously been Director of the Program Evaluation Division, part of EPA's Office of Policy, Planning and Evaluation.

From 1974 to 1976, Emison worked as an environmental engineer in EPA's Water Planning Division. He rejoined the agency in 1979 as an environmental protection specialist in the Program Evaluation Division, and had served in varying capacities in that Division until now. He received an EPA Silver Medal in 1982 for developing and implementing a management accountability system for the agency administrator, and another Silver Medal in 1983 for his work on the State-Federal Roles Task Force.

From 1976 to 1979, Emison worked first as a policy planning coordinator for the County Council of Montgomery County, Maryland, and later as a management consultant specializing in state environmental programs for Roy F. Weston, Inc.

Emison was in the U.S. Navy Civil Engineer Corps from 1968 to 1972. He holds a bachelor's degree in engineering from Vanderbilt University, a master's degree in regional planning from the University of North Carolina at Chapel Hill, and a master's degree in engineering management from Catholic University. He is a registered professional engineer in Maryland and the District of Columbia.

Edward Klein, the new Director of the TSCA Assistance Office, is responsible for providing liaison with industry, unions, environmentalists, the press, and congressional staff on behalf of the Office of Toxic Substances. Klein has been with EPA since 1980, serving as Director of the Chemical Control Division of the Office of Toxic Substances.

From 1974 to 1980, Klein was a Special Assistant to the Associate Solicitor for Occupational Safety and Health in the U.S. Department of Labor. Prior to that he served as an attorney for the National Labor Relations Board.

Klein is the recipient of a Bronze Medal and a Distinguished Achievement Award from EPA, as well as a Distinguished Achievement Award from the Department of Labor. He holds a bachelor's degree from Pennsylvania State University and a doctor of jurisprudence degree from New York Law School.

Thomas Adams

Frederick Fields

Dr. Richard T. Dewling

Richard Rykowski (right) receives EPA's Federal Engineer of the Year award from Richard Wilson, Director of the Agency's Office of Mobile Sources.

Edwin Tinsworth has joined EPA as Deputy Director of the Office of Toxic Substances. He comes to the agency from the U.S. Consumer Product Safety Commission, where he had worked since 1972. He served in several management positions at the Commission, most recently as Director of the Office of Budget, Program Planning and Evaluation.

Tinsworth began his federal career in 1968 as an inspector for the Food and Drug Administration's Philadelphia office. He also served as a management intern with FDA from 1970 to 1972.

In 1974, and again in 1978, Tinsworth received a Silver Medal for Meritorious Service from the U.S. Consumer Product Safety Commission. He holds a bachelor's degree from Providence College.

Thomas Adams has been named Deputy General Counsel (Regional Coordination) in the Office of General Counsel. Before assuming that position in an acting capacity in August 1983, he was EPA's Associate General Counsel for Legal and Enforcement Liaison.

Adams began his government career in 1970 at the Department of Justice, Land and Natural Resources Division, where he served as an Appellate Attorney. In 1972 he was named as Minority Counsel to the Subcommittee on Environment and Consumer Affairs, U.S. Senate Commerce Committee. In 1975, Mr. Adams served as Legislative Counsel to the Small Business Administration; and from 1975 to 1977, as Assistant General Counsel for Legislation at the Federal Trade Commission. Prior to joining EPA in March 1983, Adams was Assistant Director of Government Relations for Republic Steel Corporation.

Adams served as an officer in the U.S. Navy with the Second and Sixth Fleets from 1963 to 1967. He holds a bachelor's degree from the University of Virginia and a doctor of jurisprudence degree from Vanderbilt University.

Frederick Fields has been named Chief of the Press Division in EPA's Office of Public Affairs. Fields comes to EPA from the Tennessee Valley Authority, where he was assistant to the manager of TVA's Office of Natural Resources and Economic Development.

Fields had been with TVA since 1964. During his service there, he took a one-year break to work for the Associated Press and, in 1981, was selected to participate in the President's Executive Exchange Program. The program involved one year's work on the environmental quality staff of the General Electric Company.

Before joining TVA, Fields was a reporter for United Press International, the *Knoxville Journal*, and the *Kingsport Times-News*. He holds a bachelor's degree in journalism and a doctor of jurisprudence degree, both from the University of Tennessee. He is licensed to practice law in Tennessee.

Richard T. Dewling, Deputy Administrator of EPA's Region 2 office in New York, was awarded the Presidential Distinguished Rank Award in a recent White House ceremony.

Dewling, one of 38 senior executives government-wide and the only EPA scientist to receive this award, was cited for his "remarkable combination of managerial capacity and scientific expertise."

Recipient of the Presidential "Meritorious Award" in 1980, he is the first EPA executive ever to receive both Presidential Awards.

Dr. Dewling has served with EPA since its founding in 1970. He became Deputy Regional Administrator in June 1978, and has acted as Regional Administrator for extended periods since that time between appointments of Regional Administrators.

From 1972 to 1978, he was Director of the Region 2 Surveillance and Analysis Division. From 1970 to 1972, as Director of EPA's Municipal Environmental Research Laboratory branch in Edison, N.J., he established and managed the National Oil and Hazardous Materials Program.

Dr. Dewling holds a Ph.D. in Environmental Science from Rutgers University.

Richard Rykowski received EPA's Federal Engineer of the Year Award for 1984 in ceremonies sponsored by the National Society of Professional Engineers. Rykowski is a Senior Project Manager in the Emission Control Technology Division of the Office of Mobile Sources, part of EPA's Office of Air and Radiation.

Rykowski was nominated for the honor because of his outstanding achievements in the field of regulatory development related to mobile source emission control issues. He has prepared comprehensive reports evaluating the environmental need for and cost of diesel particulate control, the economics and environmental impact of alternative fuels, and the establishment of emission control programs at high altitudes.

Rykowski holds bachelor's and master's degrees in chemical engineering from the University of Michigan. □

Update

A review of recent major EP/ activities and developments the pollution control areas.

AIR

Air Cleanup Progress

America has made significant progress in improving its air quality during the period 1975 to 1982, according to a new report by EPA.

"America's air is getting cleaner," said Joseph A. Cannon, Assistant EPA Administrator for Air and Radiation. "There are long-term improvements in almost all of the major pollutants. However, there is still much to be done in order to have all areas of the country fully meeting the national air quality standards."

Citing figures from the latest EPA air pollution study, "National Air Quality and Emissions Trends Report, 1982," Cannon pointed out that from 1975 to 1982:

- Sulfur dioxide air quality levels improved 33 percent
- Carbon monoxide levels improved 31 percent
- Particulate levels improved 15 percent
- Ozone levels improved 18 percent
- Lead levels improved 64 percent
- Nitrogen dioxide levels deteriorated from 1975 to 1979 and then began improving, resulting in no long-term change.

Proposed Asbestos Penalty

EPA is assessing a proposed $24,000 penalty against the Washington, D.C., public school system for federal asbestos rule violations at three schools and the school district's administrative office.

The administrative civil complaint, issued under authority of the Federal Toxic Substances Control Act (TSCA), alleges that the D.C. schools' administrative office violated part of EPA's asbestos rule by failing to keep adequate records of inspections at schools under its jurisdiction.

"This action, coming within weeks of EPA civil penalties against 13 other school systems, should send a clear and unequivocal message to school officials throughout the country that we will not tolerate continuing violations of EPA's asbestos rule," said EPA Deputy Administrator Alvin Alm. "This rule, designed to alert parents to any asbestos danger faced by their children, was made effective and fully publicized in May, 1982. Schools were given over a year—until June 28, 1983—to come into compliance. There is no excuse for continuing violations, and EPA has no intention of letting this potentially hazardous situation continue."

Voluntary Recall

American Motors Corporation has voluntarily offered to service approximately 62,400 1979 model year vehicles to improve the performance of their emissions system for controlling hydrocarbons and carbon monoxide, EPA recently announced.

The affected vehicles are 1979 Concord, Spirit and Pacer models equipped with the 258-cubic-inch displacement engine and automatic transmissions. California vehicles are not included in this action.

Testing conducted by EPA has shown that these vehicles have average hydrocarbon and carbon monoxide emissions which exceed the 1979 federal emission standards of 1.5 and 15 grams per mile, respectively.

Proposed Funding Sanctions

EPA has announced a proposed cut-off of federal highway funds for the Chicago and East St. Louis areas of Illinois as a result of the state's failure to comply with the automotive emissions inspection and maintenance requirements of the Clean Air Act.

Under the Act, areas of the country which could not meet federal ozone and/or carbon monoxide pollutant standards by 1982 were required to implement a tailpipe emissions inspection as a condition for receiving a five-year extension of the deadline. Both the Chicago and East St. Louis metropolitan areas received extensions but failed to start the inspections programs, as required, by December 31, 1982.

The proposed restrictions would withhold federal highway and air quality planning grants from Illinois for the areas affected.

ENFORCEMENT

Enforcement Activity Increases

Nationwide enforcement activity has increased significantly since January, EPA announced recently.

The agency released new figures reflecting enforcement activity from January - March 1984 (second quarter of the fiscal year). The figures indicate a near doubling of administrative and tripling of referral activity over 1st quarter levels (October - December, 1983).

Administrative Orders (direct, non-judicial enforcement actions) increased from 402, first quarter, to 712, second quarter. Judicial case referrals from the regional offices to EPA and the Department of Justice headquarters in Washington increased from 22, first quarter, to 95, second quarter.

The activity is the result of new enforcement management steps implemented agency-wide to facilitate case development and referrals. The steps included increasing enforcement budgets, especially at the regional level, to allow regional offices to increase the number of inspections and levels of administrative enforcement actions.

HAZARDOUS WASTE

Hazardous Waste Report

EPA has issued a final report on its estimates of the volume of hazardous wastes generated and managed by American industry in 1981, the first full year that the Resource Conservation and Recovery Act (RCRA) was in effect.

Final estimates put the volume of wastes generated in 1981 at 264 million metric tons, equal to 71 billion gallons. This volume is approximately equal to the 71.3 billion gallons managed in treatment, storage, and disposal facilities during that year. The figures for the volume generated represent a 60 percent increase over a preliminary EPA estimate made last August.

However, the agency said there are enough EPA-regulated treatment, storage, and disposal facilities to manage the larger waste volume safely.

The regulation of hazardous wastes in this country essentially began in 1981 under the Resource Conservation and Recovery Act (RCRA). The newest estimate based on the 1981 data gives EPA its most accurate picture to date of the annual quantity of wastes now being regulated nationwide under the RCRA rules.

Waste Cleanup Role

Policies and procedures designed to expand the role of private companies in the cleanup

of hazardous sites where they are responsible for environmental contamination were recently released by EPA.

A policy memorandum to agency regional administrators explains when responsible parties will be permitted to participate in development of remedial investigations and feasibility studies at Superfund priority sites. Participation would occur under strict agency guidelines. The agency then would determine a final remedial solution based on the results of the investigations and studies.

PESTICIDES

EDB Tolerance Levels

Federal tolerance levels for residues of the pesticide ethylene dibromide (EDB) on raw grains have been issued by EPA. These tolerance levels, together with the action levels adopted previously for residues of EDB on grain-based food products, are enforceable immediately.

The action sets the maximum permissible residue level of EDB on raw grains at 900 parts of EDB per billion parts of grain (ppb), the same maximum initially proposed in February. The tolerance level will apply to raw barley, corn, oats, popcorn, rice, rye, sorghum (milo), and wheat. The maximum residue level for ready-to-eat products—bread, cold cereals, baked goods, etc.—is 30 ppb. For intermediate grain-based food products which require cooking before eating the residue level is 150 ppb. The intermediate category includes flour, hot cereals, mixes for baked goods and similar products.

Conditional Registration

EPA has proposed to grant conditional registration for the use of the pesticide cyromazine (larvadex) to control fly larvae in the manure of egg-producing chickens.

The agency also is proposing to set tolerances for maximum residues of cyromazine in eggs, poultry meat and meat by-products, and to establish feed-additive regulations to permit use of this pesticide in poultry feed.

The proposed use of cyromazine would be limited to layer hens. If the conditional use of the larvacide is approved, it would only remain in effect until December 31, 1985.

The agency has concluded that the benefits of cyromazine are significant: the product is effective for controlling disease-transmitting flies which are a major problem in caged layer hen operations; it poses less risk than many, if not all, of the conventional pesticides registered to control flies in poultry operations; the product is easily applied; and it has little or no adverse effect on natural predators of flies.

Ethylene Oxide Rules

New requirements are being enacted by EPA which will change the way the pesticide ethylene oxide (EtO), a fumigant and sterilant, is used in hospitals and health-care facilities. The agency made this decision after determining that EtO may present unacceptable health risks to workers at current levels of exposure.

In order to reduce hospital and health-care facility worker exposure to EtO, the agency has requested that registrants of EtO products make label changes which will require users to modify work-place practices and the way in which work-places are designed.

TOXICS

1,3-Butadiene

EPA announced an Advanced Notice of Proposed Rulemaking (ANPR) to consider regulation of a chemical called 1,3-Butadiene.

Recent laboratory tests indicate that 1,3-Butadiene may cause cancer.

A colorless gas, 74 percent of 1,3-Butadiene is produced as a by-product of ethylene manufacture during petroleum refining.

The primary potential for human exposure to 1,3-Butadiene appears to occur via inhalation of the gas.

EPA is currently evaluating the carcinogenic, teratogenic and reproductive effects of 1,3-Butadiene.

EPA is seeking public comment in five areas: (1) health effects; (2) manufacture, processing, use and disposal; (3) human exposure; (4) appropriate controls and their costs; and (5) chemical substitutes.

WATER

Ocean Dumping Action

EPA is proposing to end disposal of sludge 12 miles offshore in the New York Bight Apex and is designating two disposal sites at the so-called 106 Mile Ocean Waste Dump Site off the Atlantic Coast to receive municipal sewage treatment sludge and aqueous industrial wastes.

At the same time the agency is designating a site known as the Mud Dump Site in the New York Bight for the disposal of dredged materials.

With regard to the tentative determination to deny petitions to redesignate the 12-Mile Site, Jack E. Ravan, EPA Assistant Administrator for Water, said, "It is generally acknowledged that the New York Bight Apex is heavily degraded. The agency has determined that the dumping of municipal sludge at the 12-Mile Site contributes to this degradation. We anticipate that this decision, along with a series of other agency programs, will help to improve the overall quality of these waters which are a source of food and recreation for millions of people annually and vital to the economic well-being of the entire New York and New Jersey metropolitan area."

At-sea Incineration

A decision to deny the use of at-sea incineration for hazardous waste disposal was announced by Jack E. Ravan, EPA's Assistant Administrator for Water.

At the same time, Ravan directed that a comprehensive research plan be developed before any further research burns may take place.

Ravan's decision came one month after receiving the EPA Hearing Officer's recommendations on the agency's tentative determination to issue special (operational) and research permits for at-sea incineration of hazardous wastes in the Gulf of Mexico. The burns would have been performed by two specially designed ships, Vulcanus I and II, at a site approximately 195 miles east of Brownsville, Texas.

Underground Disposal Rules

EPA announced that it will establish programs in 22 states and territories to control the underground disposal of liquid wastes.

With this rulemaking, EPA will be directly administering an Underground Injection Control (UIC) program for all types of wells in 18 states and for certain types of wells in four more. Some 26 states have already been granted complete responsibility for running the program, in most cases for all types of injection wells. EPA's action, together with the state programs now in effect, provides coverage of nearly all of the wells handling hazardous waste and more than 90 percent of those injection wells associated with oil and gas production.

Coal Wastewater Rules

EPA recently announced that it is proposing revised regulations for the control of pollutants in wastewater from coal mines and coal preparation plants.

The new rules are the result of a settlement between the agency and the National Coal Association, the Commonwealth of Pennsylvania, and the West Virginia Mountain Streams Monitors, Inc., an environmental group. The three organizations had sued EPA after it promulgated regulations October 13, 1982, for the industry; the parties agreed to a settlement last August based on modifications in the rules.

The agreement covers proposed regulations for discharges from coal mines caused by precipitation; revises new source performance standards for coal preparation plants; and modifies the agency's definition of new source coal mines.

In addition to the settlement agreement, EPA also is proposing technical changes involving coal-mining water pollutants known as settleable solids, as well as permits for new source coal mines and coal preparation plants.

Refinery Pollution Control

A three-party settlement of litigation involving the control of pollutants in wastewater from petroleum refineries was reported by EPA.

The settlement will lead to more stringent control of certain wastewater pollutants as well as the regulation of pollutants in storm water from refinery property.

The settlement includes the agency, the Natural Resources Defense Council, Inc. (NRDC), and the American Petroleum Institute (API) and its members. NRDC sued EPA after the agency promulgated regulations on October 18, 1982 for the industry, and API then joined the lawsuit. The parties had conducted protracted settlement negotiations since July 1, 1983. □

The Bluebirds of Antietam

"Wednesday, September 17, 1862, ranks as the bloodiest one day of an incomparably bloody civil war. In and around Sharpsburg, along the banks of a sluggish stream known as Antietam Creek, over 23,000 Americans fell dead or wounded in the course of a single day's fighting. It was war at its worst. Bruising, vicious open combat." -

—Description on wall of U.S. Park Service Visitors Center at Antietam, Md.

In the same building where this description can be found is an observation room that provides a panoramic view of the celebrated battlefield some 70 miles northwest of Washington, D.C.

Through the large glass windows one can see sweeping vistas of the battlefield with its numerous monuments to those who died in the savage fighting there.

Also visible from these windows are some wooden boxes which have been erected on fence posts as nests for the resurgent bluebird population which is adding a new dimension to the reputation of this historic battlefield.

The soft melodious song of the bluebird is often heard now as these symbols of happiness wing across the once blood-soaked fields. The birds are members of the thrush family, mastersingers, which also includes the Old World's famed nightingale.

The population of bluebirds has declined drastically in recent years, partly because of a reduction in their favorite habitat of open fields. Bluebirds must also compete for cavity nesting sites in dead trees or fence posts with house sparrows and starlings, both alien birds introduced into this country many years ago.

While most bluebirds migrate to warmer climates in winter, some freeze to death when they fail to time their migration trips correctly. In severe winter weather, as many as a dozen bluebirds have been found bundling together in a nesting box to escape the bite of icy temperature.

To prevent the disappearance of the bluebirds a group known as the North American Bluebird Society has been formed under the leadership of Dr. Lawrence Zeleny. One of its main objectives is to provide nesting boxes to help increase the number of these songbirds.

Bluebirds were once abundant on the fields of Antietam but their population had also greatly diminished in recent years. To stimulate the return of these songsters, Mark Raabe, recording secretary of the North American Bluebird Society, has, with the approval of the U.S. Park Service, placed 55 boxes on the battlefield and 20 others on property nearby.

"These birds are justly celebrated in poetry and song for their beauty and delightful singing," Raabe commented. He estimated that his nest boxes have helped the Antietam bluebirds raise some 750 new birds.

He explained that the boxes have to be monitored frequently so that undesirable tenants such as house sparrows or starlings can be evicted.

Approximately 4,000 people now have joined the North American Bluebird Association to help foster the resurgence of this bird.

A great admirer of the bluebird was Thoreau who commented on its vivid blue color by observing that "it carries the sky on its back." Colonists used to call this bird the "blue robin" because in addition to a blue back, it sports a russet breast.

At Antietam you can now often see these birds emerge from their nest boxes and perch on grass stems near the long lines of limestone rocks jutting from the green fields.

A battlefield marker nearby notes "stone outcroppings such as these provided many Confederate soldiers with ready-made defenses."

At the Visitors' Center the walls of one of the rooms carries pertinent quotations by soldiers or observers of the great battle, including the following by Mary B. Mitchell, a resident of nearby Shepherdstown: "As night drew nearer, whispers of a great battle to be fought the next day grew louder and we shuddered at the prospect, for battles had come to mean to us, as they never had before, blood, wounds and death."

A strikingly different atmosphere was noticed on a recent visit to the battlefield. From the observation tower one could see a pastoral setting of rolling farmland with red barns, pastures where cows placidly chewed their cuds, and the town of Sharpsburg nestled in the distant hills.

The only sounds from this tranquil scene were the occasional bawling of a calf looking for its mother, the cawing of a passing crow, and the excited yelling of children climbing the tower steps.

"Oh, look at the bluebird down there!" cried a little girl as she peered over the tower railing.

"Bluebird! bluebird! bluebird!" the children chanted to their friends still climbing the staircase.

The bird the children noticed was flying over "bloody lane," a sunken road at the end of a cornfield where soldiers had once been slaughtered by withering fire. The bird was carrying straw to line the interior of a nearby wooden nesting box. And so began the start of another nesting year, bringing a note of peace and beauty to a landscape scarred by the memory of an ugly and savage battle.

One of the most eloquent endorsements made about efforts such as the bluebird campaign to preserve the Nation's natural heritage was offered by the late Donald C. Peattie, the noted botanist and writer, in the following words:

"Once they are gone, the trees and the grasslands, the screaming waterfowl, the beavers and the antelope, we can only remember them with longing. We are not God. We cannot make America over again as it was in the beginning, but we can come to what is left of our heritage with a patriot's reverence." — C. D. P.

Clean air and flowers in northern Utah's Wasatch Mountains EPA joined the American Lung Association, the State and Territorial Air Pollution Association, and the Association of Local Air Pollution Control Officials in sponsoring National Clean Air Week in May

Back cover: A U.S. Department of Agriculture photo of a field of young corn growing in rural Cass County, Nebraska.

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