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**EPA Should Act Promptly to Minimize
Contamination of Groundwater by Pesticides**

Statement of
Keith O. Fultz, Director
Planning and Reporting
Resources, Community, and Economic
Development Division

Before the
Subcommittee on Oversight and Investigations
Committee on Energy and Commerce
House of Representatives



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Mr. Chairman and Members of the Subcommittee:

We are pleased to be here today to testify on the Environmental Protection Agency's (EPA) efforts to deal with the problem of groundwater contamination by pesticides. It has been known for some years that certain pesticides leach through soil into groundwater from normal agricultural applications. Our testimony is based on our report that you are releasing today.¹ Our report evaluated EPA's efforts to assess pesticides' leaching potential, regulate pesticides that may leach into groundwater, and consider human exposure to pesticides in groundwater when setting and reviewing limits for pesticide residues in food.

Groundwater contamination raises concerns about potential effects on the health of many Americans. About 40 percent of the United States' population--over 90 percent in rural areas--depends on groundwater for its drinking water. Because groundwater often discharges into surface water, groundwater contamination can also adversely affect wildlife, sensitive ecosystems, and people whose drinking water comes from surface water.

Let me cite a couple of examples of the serious impact that contamination can have. In Hawaii, where citizens rely almost exclusively on groundwater for drinking water, nine municipal wells were closed and 13 million gallons of water per day were removed from service, due to contamination by DBCP and EDB.² As of August 1987, remedial actions had cost \$9 million dollars. In areas of at

¹Pesticides: EPA Could Do More to Minimize Groundwater Contamination (GAO/RCED-91-75, Apr. 29, 1991).

²Dibromochloropropane (DBCP) was a fumigant used on cotton, soybeans, and a number of fruits, nuts, and vegetables. Ethylene dibromide (EDB) was a fumigant used on soil before planting, stored grain, grain milling machinery, and quarantined fruits and vegetables.

least six other states, filtration systems or other remedial actions have been needed to reduce the levels of aldicarb in drinking water to a safe level.³ Aldicarb's manufacturers have spent several million dollars on filtration systems.

Groundwater contamination presents a serious problem because treating water before use is expensive and does not reduce the contamination in the aquifer. Rehabilitating aquifers is extremely costly and not always feasible. Therefore, EPA needs to act preventively to minimize contamination by pesticides while it is still well below the level that would present a health risk.

Mr. Chairman, EPA needs to take more initiative in ensuring that groundwater contamination by pesticides is minimized. Efforts are needed in three areas. First, EPA has been slow in reviewing the scientific studies needed to assess pesticides' potential to leach into groundwater. Therefore, detailed information on the factors that contribute to leaching is not available to pesticide applicators and the pace of reassessing older pesticides has been slowed. Second, while EPA has used the regulatory tools available in some cases, the agency could do more to help prevent groundwater contamination from worsening. Third, when EPA assesses risks from pesticide residues in food--in order to set residue limits known as tolerances--the agency is not routinely considering the additional exposure that can result from pesticide-contaminated groundwater. As a result, the agency lacks assurance that tolerances for pesticides that leach into groundwater are set low enough to protect public health.

EPA plans a new program giving states a major role in managing pesticide use to minimize groundwater contamination. However, we believe regulatory actions by EPA will continue to be

³Aldicarb is an insecticide and nematicide used on potatoes, citrus fruits, soybeans, cotton, and peanuts.

needed because the new program will not cover all pesticides that leach into groundwater and because implementation of the new program is several years away.

Before discussing these issues in more detail, let me present some background concerning the extent of groundwater contamination by pesticides and EPA's overall policies concerning groundwater.

BACKGROUND

Groundwater was once thought to be naturally protected from polluting activities occurring on the earth's surface. However, in 1979, two pesticides--aldicarb and DBCP--were detected in groundwater. A 1985 study by EPA identified 16 pesticides as being present in groundwater. Exhibit 1 lists these 16 pesticides and the states in which they had been detected in groundwater by 1988, according to EPA's records. This exhibit is only a partial picture of the extent of the problem because our knowledge is limited by the scope of monitoring to date. Monitoring has not been done in many agricultural areas, nor has each of the 16 pesticides necessarily been tested for in each of the states listed. Moreover, additional pesticides have been detected; in 1988, EPA reported that 46 pesticides had been found to contaminate groundwater solely as a result of normal agricultural use.

Exhibit 1: States in Which the 16 Pesticides Have Been Detected in Groundwater

| State | Pesticide | | | | | | | | | | | | | | | |
|----------------|-----------|----------|----------|----------|------------|------------|---------------------|------|-------------------|---------|-----|---------|-----------|--------------|--------|----------|
| | Alachlor | Aldicarb | Atrazine | Bromacil | Carbofuran | Cyfluthrin | 1,3-Dichloropropene | DBCP | DCPA ^a | Dinoseb | EDB | Fonofos | Maldacarb | Methidathion | Oxamyl | Sinazine |
| Arizona | | X | | | | | X | | | X | | | | | | |
| Arkansas | | X | | | | | | | | | | | | | | |
| California | | X | | | | X | X | | | X | | | | | | X |
| Colorado | | | X | | | | | | | | | | | | | |
| Connecticut | X | | X | | | X | | | | X | | X | | | | X |
| Florida | X | X | | X | | | | | | X | | | | | | |
| Georgia | | | | | | | | | | X | | | | | | |
| Hawaii | | | | | | X | X | | | | | | | | | |
| Illinois | X | | X | | | | | | | | | X | X | | | |
| Iowa | X | | X | | X | | | | | | X | X | X | | | |
| Kansas | X | | X | | | | | | | | | | X | | | |
| Louisiana | X | | | | X | | | | | | | | | | | |
| Maine | X | X | X | | | | | | X | | | | X | | | |
| Maryland | X | | X | | X | X | X | X | | | | | | | | X |
| Massachusetts | X | X | | | X | X | | | X | X | | | | | X | |
| Nebraska | X | | X | | X | | | | | | X | | | | | X |
| New Jersey | | X | X | | | | | | | | | | | | | X |
| New York | | X | | | X | X | X | X | X | | | | | | X | |
| North Carolina | | X | | | | | | | | | | | | | | |
| Oregon | | X | | | | | | | | | | | | | | |
| Pennsylvania | X | | X | | X | | | | | | | X | | | | X |
| Rhode Island | | X | | | X | | | | | | | | | | X | |
| South Carolina | | | | | | | X | | | X | | | | | | |
| Texas | | X | | | | | | | | | | | | | | |
| Vermont | | | X | | X | | | | | | | | | | | X |
| Virginia | | X | | | | | | | | | | | | | | |
| Washington | | X | | | | X | | | | X | | | | | | |
| Wisconsin | X | X | X | | X | | | | | | | X | X | | | |

^adimethyl tetrachloroterephthalate.

Much of our review work concentrated on the 16 pesticides found in groundwater by 1985, because we believed that sufficient time had passed for EPA to begin taking actions on these pesticides. We focused mainly on the efforts of the Office of Pesticide Programs, which is responsible for registering (licensing) pesticides under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and for setting tolerances for pesticide residues in food under the Federal Food, Drug, and

Cosmetic Act (FFDCA). To fulfill its responsibilities under FIFRA as amended in 1972, 1978, and 1988, EPA is required to reassess the safety of older pesticides in light of current, more extensive requirements for scientific data. Many pesticides have yet to be tested, for instance, for their potential to cause birth defects, cancer, and other chronic health effects. The time frame established by 1988 amendments for completing this reassessment and reregistering pesticides is 9 years. There are currently approximately 420 active ingredient cases and 23,000 pesticide products subject to reregistration.⁴ During the reregistration process, EPA is also reassessing tolerances.

Of the 16 pesticides identified in groundwater by 1985, EPA has canceled, or removed from the market, 3--DBCP, dinoseb, and EDB. Two of these cancelations were based in part on concerns about groundwater contamination. The remaining 13 pesticides are still in use and are subject to reregistration.

In addition to undertaking regulatory activities, EPA undertakes other activities related to groundwater contamination. For example, in 1984, EPA published a groundwater protection strategy, which first established a framework for addressing, through all agency programs, groundwater problems. In 1986, EPA held a major workshop and began working on a strategy specific to the problem of groundwater contamination by pesticides. This strategy is not yet final. A draft of the strategy envisions a strong state role and emphasizes preventing contamination that presents risks of adverse effects to human health and the environment. In July 1989, EPA's Administrator established a groundwater task force to develop overall principles to help ensure consistency among EPA's various decisions and programs affecting

⁴An active ingredient is an ingredient intended to control or kill a pest, such as an insect or weed. An active ingredient case is a group of related active ingredients.

groundwater. These principles, including EPA's overall goal concerning groundwater, are still being debated.

Other agencies, including the U.S. Department of Agriculture (USDA), also conduct activities addressing groundwater contamination. In our July 1990 report, we noted that USDA has expanded ongoing water quality programs, started new programs, and developed relevant policies.⁵ However, we found that the programs were not effectively coordinated and recommended that USDA establish a coordinating body and develop a comprehensive water quality policy. We also found that USDA's program to support low-input sustainable agriculture--farming practices that reduce the use of agricultural chemicals--was not integrated into the agency's water quality initiative.

Let me now discuss our three major findings in more detail.

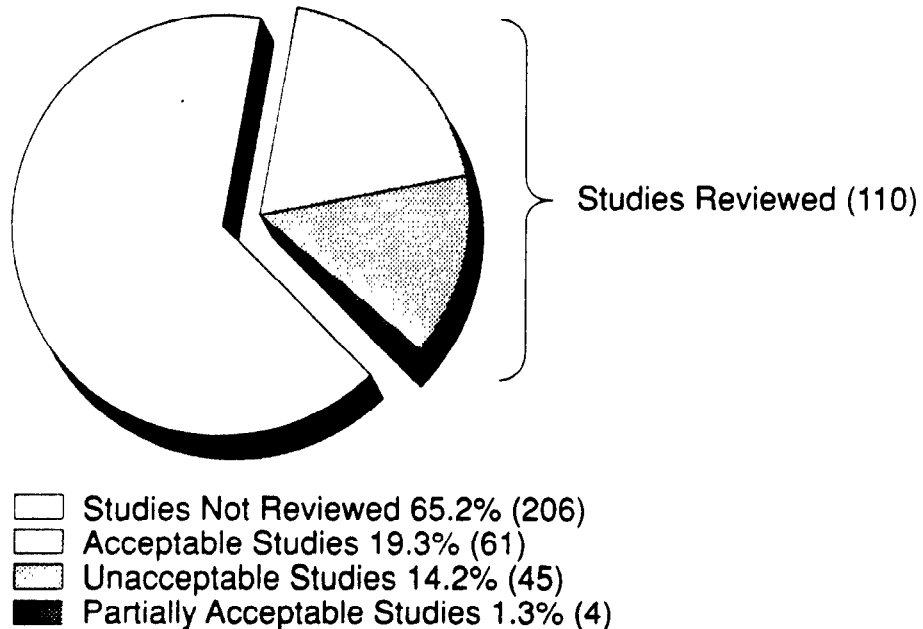
LIMITED PROGRESS IN ASSESSING
LEACHING POTENTIAL

EPA has made limited progress toward fully assessing the leaching potential of the 13 pesticides still in use that had been identified as groundwater contaminants by 1985. Through the reregistration program, EPA has required pesticide registrants (manufacturers) to submit a number of studies needed to determine the 13 pesticides' potential to leach into groundwater under various conditions. For example, studies have been required to help determine a pesticide's persistence in soil and its ability to leach through various types of soil. Once acceptable data are available, we believe that EPA should provide pesticide applicators with specific information on factors promoting the leaching of individual pesticides.

⁵Agriculture: USDA Needs to Better Focus Its Water Quality Responsibilities (GAO/RCED-90-162, July 23, 1990).

As of May 1990, EPA had reviewed only 110 of the 316 studies submitted for the 13 pesticides, and some studies had been awaiting review as long as 5 years. The agency found about 40 percent of the studies it reviewed to be unacceptable. (Exhibit 2 illustrates the status of the 316 studies submitted.) Unacceptable studies either will need to be redone, or registrants will need to submit additional information. Reasons for unacceptable studies, according to an official who oversees study reviews, include registrants' not submitting all critical information or not following EPA's guidelines for conducting studies. EPA recently sent registrants additional guidance to help improve studies.

Exhibit 2: Status of Studies



Note: Total number of studies received = 316.

EPA has reviewed only about one-third of the 316 studies submitted because of a shortage of review staff and a policy under which studies addressing the potential for groundwater contamination were not a priority. With resources from reregistration fees authorized by the 1988 amendments to FIFRA,

EPA has hired more staff to review such studies. However, it is unclear whether the additional reviewers will be sufficient to both review, in a timely fashion, the backlog of studies and keep pace with the new submissions of studies EPA expects to receive as approximately 420 pesticide active ingredient cases undergo reregistration. Pesticide program officials have assured us that a group of major food-use pesticides--which includes the 13 pesticides covered in our review--has a high priority for review.⁶

It is possible that more than 15 years could pass from the time a pesticide was first discovered in groundwater to the time EPA could completely assess its leaching potential and make a reregistration decision. EPA's slow pace of review and the unacceptability of some studies have delayed an already lengthy process. In the case of atrazine, for example, EPA originally imposed data requirements in 1983 to determine the pesticide's leaching potential. By November 1988, EPA had reviewed the studies submitted and found about half to be unacceptable. In September 1990, the agency issued a notice requiring replacement studies. Some of the data required under the 1990 notice will not be due until 1992--9 years after EPA's initial data requirements were imposed. The data will have to be reviewed, and if they are acceptable, EPA could then make a decision about reregistering atrazine. If some data are unacceptable and have to be redone, it could be several more years before EPA could fully assess the pesticide and make a reregistration decision.

⁶EPA had begun to require data for 194 pesticides under its previous Registration Standards program. The 1988 amendments to FIFRA refer to these as "List A" pesticides. List A contains many extensively used agricultural pesticides that EPA considers to have priority for reassessment, including the 13 pesticides in our review.

NEED FOR MORE ACTIVE
REGULATION BY EPA

While valid data are needed to fully understand the conditions--such as soil types and climatic conditions--that promote a pesticide's potential to leach into groundwater, EPA has known since 1985 that the 16 pesticides leach under some conditions because through monitoring, these pesticides were detected in groundwater. Therefore, on the basis of existing knowledge, EPA could take regulatory measures to minimize groundwater contamination. Although the agency has taken some actions, EPA's use of available regulatory measures has not been consistent, and the agency could be more active in regulating to prevent groundwater contamination by pesticides from presenting risks to human health and the environment. In addition, EPA needs to strengthen its consideration of groundwater contamination in the Special Review process, a risk-benefit analysis that the agency uses to consider imposing certain regulatory measures. EPA's current criteria for initiating Special Reviews do not specifically address groundwater.

Inconsistent Use of
Regulatory Measures

EPA has not been consistent in regulating known groundwater contaminants through using measures such as prominent advisories on pesticides labels, prohibitions on use within a specified distance of wells (i.e., well setbacks), and prohibitions on use in designated geographic areas where a pesticide's level in groundwater is approaching the level presenting health risks. Also, in trying to restrict pesticides' use to certified applicators because of concerns about groundwater contamination, the agency has been unsuccessful. Exhibit 3 summarizes several regulatory actions taken for these pesticides because of concerns about groundwater contamination.

Exhibit 3: EPA's Regulatory Actions for 13 Pesticides

| Pesticide | Ground-water Advisory | Restricted Use Due to Ground-water | Well Setback | Geographic Use Prohibition |
|------------------------|------------------------------|---|---------------------|-----------------------------------|
| 1. Alachlor | X | | | |
| 2. Aldicarb | | | X | X |
| 3. Atrazine | X | X | X | |
| 4. Bromacil | X | | | |
| 5. Carbofuran | X | | | X |
| 6. Cyanazine | X | | | |
| 7. DCPA | | | | X |
| 8. 1,3-Dichloropropene | | | | |
| 9. Fonofos | | | | |
| 10. Metolachlor | X | | | |
| 11. Metribuzin | X | | | |
| 12. Oxamyl | X | | | X |
| 13. Simazine | X | | | |
| Total Number | 9 | 1 | 2 | 4 |

Note: Although only 1 pesticide is classified restricted-use due to concern about groundwater contamination, 8 of the 13 pesticides are currently classified restricted-use for other reasons.

Of the 13 pesticides remaining in use, 4 lack informational advisories on pesticide labels to inform users of the potential risk of groundwater contamination. These groundwater advisories alert users that the pesticide has been detected in groundwater and/or that the pesticide has the potential to leach in soil. Pesticide program officials did not know the reason these four pesticides lack advisories. Of the nine pesticides with advisories, six do not have the advisories prominently shown on labels; advisories for the other three pesticides have headings that make them easier to locate on the labels.

Labels for only 2 of the 13 pesticides prohibit their use near wells. However, EPA could impose well setbacks on the basis of general knowledge about the soil types in which pesticides are most likely to leach.

EPA can also prohibit use in designated geographic areas known to have potentially serious contamination, but the agency has not actively pursued using this measure. Although the use of 4 of the 13 pesticides has been prohibited in certain counties on Long Island, New York,⁷ these prohibitions were volunteered by pesticide registrants as a result of extensive groundwater contamination discovered in that area, according to officials in EPA's Registration Division. If a pesticide has been detected in groundwater, EPA could be more active in preventing further contamination by setting a percentage of the EPA-established health advisory level--a level considered safe in drinking water--as a criterion for prohibiting use in designated locations. When a pesticide was detected in groundwater at or above the predetermined percentage set by EPA, the agency could investigate local conditions and establish a geographic area in which use of the pesticide would be prohibited. This would help prevent contamination from increasing to a level presenting health risks to the local population.

The agency has been unsuccessful in imposing the restricted-use classification on the basis of pesticides' potential to contaminate groundwater. This classification restricts the use of pesticides to certified applicators and individuals under their direct supervision. Only 1 of the 13 pesticides has been classified restricted-use on this basis, and the registrant volunteered for this action. EPA's past attempts to impose the measure failed because the agency's regulations lacked specific criteria addressing groundwater contamination, according to a pesticide program official. Also, the registrant of simazine successfully challenged EPA's attempt to impose the restricted-use classification. In 1985, the issue was brought before the FIFRA Scientific Advisory Panel, a group of outside experts who advise

⁷The use of one of the four also has been prohibited in certain counties in California and Oregon.

EPA. The panel concluded that detections of simazine in groundwater did not indicate the pesticide was occurring extensively at levels warranting serious concern and that existing toxicity data did not indicate simazine posed a toxic threat to humans. EPA thereafter rescinded simazine's restricted-use classification and dropped attempts to classify two other pesticides restricted-use on the basis of concern about groundwater contamination. Simazine has since been found to be a possible human carcinogen.

After EPA's unsuccessful attempts to impose this measure, an agency work group began meeting in 1987 to develop a rule to facilitate imposing the restricted-use classification. EPA is proposing a rule to establish criteria for restricting the use of certain pesticides to certified applicators, on the basis of the pesticides' potential to reach groundwater on a widespread basis. (On April 25, 1991, the proposed rule was approved for publication, and it should be published for comment in the Federal Register during May 1991.) EPA believes certified applicators may be better able to avoid contaminating groundwater because they are more likely to have the training, knowledge, and equipment that may be needed. The agency also has proposed regulations that would require certified applicators to receive training on preventing groundwater contamination and has prepared relevant training materials.

It should be also be noted that EPA implemented uniform label requirements in 1987 for pesticides applied through irrigation systems, in a practice known as chemigation. For pesticides applied through chemigation, the label must require the use of certain safety equipment to prevent fluid containing pesticide from flowing backward towards the well or other water source.

Need to Strengthen Consideration
of Groundwater in Special Reviews

The regulatory process known as Special Review could also be used by EPA to give greater consideration to risks resulting from groundwater contamination. EPA may initiate a Special Review when new evidence raises concern about a significant health or environmental risk, as FIFRA requires the agency to consider risks and benefits in regulating pesticides. EPA has addressed concerns about groundwater in Special Reviews of some pesticides. As mentioned previously, the agency has canceled all uses of 3 of the 16 groundwater contaminants on the basis of Special Reviews. EPA's cancelations of DBCP and EDB were based in part on the fact that contamination was occurring at levels presenting health risks. Four other pesticides (alachlor, aldicarb, carbofuran, and 1,3-dichloropropene) among the 16 are currently in Special Review. Risks to groundwater are being considered in each of these reviews.

However, the agency's criteria for initiating Special Reviews do not specifically address groundwater. EPA's current practice is to assess threats to groundwater in the course of a Special Review only when a pesticide also presents other concerns, such as carcinogenicity or acute toxicity. We believe that this approach is inadequate because toxic effects of a pesticide could be discovered after aquifers have become contaminated, a situation that is extremely difficult and costly to remedy. EPA has, in fact, discovered toxic effects of a pesticide after it was known to leach into groundwater: EPA reduced the health advisory level it initially proposed for simazine because, on the basis of new testing, the agency identified it as a possible human carcinogen. Detections of simazine in groundwater did not exceed the proposed health advisory level, but several detections are above the current, lower advisory level.

At present, the toxic effects of pesticides are not fully known. Though EPA is requiring testing to determine the toxicity of pesticides undergoing reregistration, these data are not yet complete for many pesticides. In addition, the agency is adding new types of testing as science advances. Additional tests for effects on the nervous system will be required in the future, for example. Under the existing requirements for testing, many pesticides have not been tested for neurotoxicity. In light of such unknowns, our report recommends that EPA establish a criterion for initiating Special Reviews on the basis of pesticides' potential to contaminate groundwater and, in the course of reviews, consider even relatively low levels of contamination to be a risk.

Further, according to attorneys in EPA's Office of the General Counsel, FIFRA allows consideration of risks in addition to human health risks, such as the risk to groundwater as a resource, the costs of cleanup, and ecological effects to surface water systems linked to aquifers. We also believe that EPA should consider, in the course of Special Reviews, these risks to water resources resulting from pesticides' presence in groundwater. These factors may also be relevant in deciding whether to require state management plans for a pesticide.

LACK OF CONSIDERATION OF
EXPOSURE FROM GROUNDWATER IN
TOLERANCE RISK ASSESSMENTS

A third area you asked us to assess, Mr. Chairman, is EPA's consideration of exposure from groundwater when the agency sets and reviews tolerances (limits) for residues in food. Because a person's risk from a pesticide depends on the total amount ingested from food and water, accounting for exposure from both sources is critical to ensure that tolerances are set at safe levels. We found that EPA is not routinely accounting for exposure from groundwater and has no plans to do so.

In the methodology usually used by the Office of Pesticide Programs, estimated exposure from food alone is allowed to utilize 100 percent of the level considered safe--the acceptable daily intake--with no margin for possible additional exposure from water. In contrast to the pesticide office, EPA's Office of Drinking Water routinely accounts for multiple sources of exposure when it sets drinking water standards and health advisories for pesticides. The Office of Drinking Water's usual methodology is to assume that 20 percent of a person's exposure to a pesticide comes from water and 80 percent comes from food and other sources, thus allowing a margin of safety for these multiple sources of exposure.

To date, EPA has estimated and considered exposure from groundwater in tolerance risk assessments for only seven pesticides in total. These seven pesticides were undergoing Special Reviews or were under consideration for possible additional regulatory actions. In setting new tolerances, the agency has never accounted for exposure resulting from pesticides' presence in groundwater. Pesticide program officials stated several reasons for not routinely considering exposure from groundwater in tolerance risk assessments, including the difficulty of considering what is often a local situation in setting tolerances that apply nationwide. It is true that people's risks will vary, depending on whether they use well water, whether that water is contaminated, and the degree to which it is contaminated. However, we believe that combined exposure needs to be addressed to prevent potential health risks to those who encounter groundwater contamination. Otherwise, EPA lacks assurance that tolerances for pesticides that contaminate groundwater are at safe levels.

DEVELOPMENT OF NEW PROGRAM
INVOLVING STATES

EPA is making a major effort to develop a new regulatory program, under which states would develop plans to manage the use of certain pesticides to minimize groundwater contamination. Under this program, EPA would condition the use of certain pesticides on the existence of state management plans, and if a state elected not to have a plan, the pesticide could not be used in that state. EPA has decided that states are often in a better position than the federal government to deal with groundwater contamination by pesticides. The agency believes that nationwide measures could result in overregulating pesticide use in some areas where groundwater is not very vulnerable and in underregulating in areas with potentially serious problems.

When we discussed our report findings with EPA officials, two of them commented that our recommendations concentrate on nationwide regulation by EPA, a position that does not fully recognize the agency's decision to regulate through state management plans. However, we believe EPA's regulation at the national level will continue to be needed for two reasons. First, state management plans will be required only for pesticides that present serious risks of groundwater contamination; the plans will not be required for all pesticides that leach into groundwater. In our opinion, the measures that we recommend EPA use are appropriate to protect groundwater when contamination is not serious or widespread enough for EPA to require state management plans, but when contamination poses a potential health or environmental risk nonetheless.

Another reason EPA should take further regulatory measures at the national level is that fully developing and implementing state management plans for selected pesticides will take several years. As the program is in a planning stage, EPA has not yet required

state management plans for any pesticide. A pesticide program official estimates that once the agency requires plans for the first pesticide to be so regulated, states will need 2 years to develop plans, and EPA will then review and approve them. Plans for subsequent pesticides might take somewhat less time to develop. We believe EPA should use existing regulatory measures in the interim so that groundwater contamination can be minimized.

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In summary, groundwater contamination from pesticides is truly a problem where an ounce of prevention is worth a pound of cure. If contamination continues, it may create pollution that will prove extremely difficult and costly to remedy. This ounce of prevention needs to be applied more actively and consistently than it has been in the past, as EPA has not fully utilized available regulatory measures. State management plans, the focus of EPA's major new regulatory program, have not yet been implemented or evaluated. We believe that EPA should not wait for this new program, but should promptly take preventive actions. In short, Mr. Chairman, we believe that EPA should do more to protect groundwater from contamination by pesticides and to protect the health of Americans exposed to pesticides through both food and water. In our report, we have made a number of recommendations to EPA that address our concerns.

This concludes my statement, and I would be happy to respond to any questions you or Members of the Subcommittee may have.