QUESTIONS FOR THE SCIENCE ADVISORY PANEL

Chapter 1: Introduction

(1) EPA requires Prospective Ground-Water Monitoring Studies in order to help answer such questions as whether a pesticide or its degradates of concern move to ground water under actual use and field conditions and what the concentrations of the pesticide or degradates of concern are in ground water. Also, what pesticide concentrations may be in drinking water derived from groundwater in areas of pesticide use? Are the results of studies conducted following this guidance useful and appropriate for purposes of answering these types of questions?

(2) Is obtaining field data under controlled conditions important to completing accurate assessments of a pesticide's ability to move to ground water?

(3) Are the factors that OPP proposes to use to determine the need for a Prospective Ground-Water Monitoring Study appropriate given EPA's goals and how EPA would use the results of these studies?

Chapter 2: Site Selection

(1) EPA often requires that Prospective Ground-Water Monitoring Studies be conducted at sites where ground water is more vulnerable (that is, shallow, unconfined and where there are no impermeable layers between the soil surface and the water table). Given EPA's goals in conducting these studies and how EPA intends to use the results of these studies in registration and reregistration decisions, how important is it that study sites be located in areas of more vulnerable ground water?

(2) EPA has provided guidance as to what factors should be considered in identifying "typical" and "high exposure" study sites. Has EPA identified the most important factors to be considered? Should application rate also be considered an important factor?

(3) EPA requires registrants to determine the portion(s) of the pesticide's use area represented by particular study sites and EPA provides guidance on how this should be done. Is the guidance clear and will following this guidance result in accurate assessments of how the study site compares in vulnerability to all use areas?

Chapter 3: Site Characterization and Conceptual Model

(1) EPA requires registrants in conducting these studies to determine values for certain parameters of the vadose zone at test sites. For soil cores these include:

- soil texture class, particle density, bulk density, porosity, fraction sand, fraction silt and fraction clay,

- organic matter content or organic carbon content,
- field capacity (1/3 bar) and wilting point (15 bar),
- saturated hydraulic conductivity,
- hydraulic conductivity vs. soil water content and matric potential,
- field soil water content, residual water content and saturated water content,
- matric potential vs. soil water content (water characteristic function),
- Munsell color (specify moisture condition, i.e., wet or dry) and
- pH and cation exchange capacity or anion exchange capacity (if appropriate).

Field testing includes:

- soil water content,
- saturated hydraulic conductivity and
- infiltration rate

What is the minimum set of parameters needed to characterize the vadose zone so that a realistic conceptual model of the flow system can be developed?

(2) EPA requires registrants in conducting these studies to determine values for certain parameters of the saturated zone so that a realistic conceptual model of the flow system can be developed. These include:

- Direction of ground-water flow,
- Estimate of hydraulic gradient and flow velocity of the aquifer,
- Spatial distribution of hydraulic conductivity using data obtained from laboratory and field investigations,
- Water quality data from the onsite wells, the irrigation source and precipitation.

What is the minimum set of parameters needed to characterize the saturated zone so that a realistic conceptual model of the flow system can be developed?

(3) EPA requires registrants to use test pits in order get a clearer representation of the

soils at the study site. Some of the advantages of test pits are:

(A) It follows standard SCS methodology for describing soil profiles and therefore allows the soils from the test site to be more accurately correlated with SCS soils data from the rest of the pesticide use area.
(B) The ability to characterize the lateral extent or thickness of low-permeability layers noted during soil survey and exploratory boring activities or in identifying dominant patterns at a site.
(C) Identify soil structure or other features that may result in significant preferential flow.
(D) The ability to use the walls of the test pits to describe the soil profile as opposed to soil cores which do not provide as large an area for a visual assessment. Photographs of pit walls can also be taken.
(E) Install instrumentation cheaply to run additional tests for preferential flow, soil water content, matric potential, temperature, etc.

Disadvantages of test pits are:

(A) Temporary disturbance of the site or adjacent area.
(B) Need for experienced soil taxonomist/soil mapper.

Are there alternative techniques to using a test pit to provide this information essential for characterizing the site?

Chapter 4: Monitoring Plan Design

(1) We would like the members of the SAP to offer comments and suggestions on what method should be used to determine the timing and amount of irrigation water that needs to be applied to the study area to achieve meaningful results from a prospective ground-water study. There are several ways of determining how much water should be applied. These include but are not limited to:

(A) A percentage of average yearly net recharge.

(B) Maximum historic yearly net recharge.

(C) Determined by crop need or “typical agricultural practices”.

(D) Sufficient water to create a downward hydraulic gradient.

(F) Sufficient water to transport the tracer to the water table within some specific period of time as calculated from soil hydraulic properties.

There are limitations and drawbacks for any one way of determining how much water to apply. The major point of the study is to see if the pesticide will be transported through

the vadose zone to the water table, and if so how fast and in what concentration. The amount of water applied must exceed the amount evapotranspired if there is to be any net downward movement. It must also exceed the capacity for storage in the vadose zone. Using an amount based on yearly averages, maximum, crop need or typical practices does not guarantee that enough will be applied to get downward transport. Using application based on transport time for a tracer ignores processes, such as sorption, which retard pesticide movement in the soil. Pesticide compounds usually are sorbed to soil solids to a greater extent then anionic tracers typically used and will therefore move slower. In some regions precipitation is never sufficient to exceed evapotranspiration and soil retention so there is no net downward movement of water. Requiring irrigation to create net downward flow does not appear appropriate in such areas.

(2) The second question related to irrigation pertains to the timing and amount of water that is applied in the first post-application irrigation event**.** EPA proposes that water, in the form of precipitation or irrigation, must be applied within three days after pesticide application. The amount of water in this initial application will be determined by historical data for the magnitude of precipitation events as recorded at nearby weather stations. Is this a valid procedure considering the goals of the Prospective Ground-water Monitoring Study.

(3) Collection and analysis of soil samples. Soil samples collected after application of the pesticide and tracer are primarily used to verify application rates. There does not appear to be a need for a large number of samples to be collected over the course of the study at many depths. Is it valid to limit the number of soil samples to those collected within the first few months of the study and to shallow depths? What is the trigger for stopping collection of soil samples?

(4) When is it acceptable to reuse sites? How should it be proven that prior use of a site will not affect the current study? How can adaptation or alteration in soil microbiology and chemistry be determined and screened for? How can residual tracer material be corrected for?

(5) Should a well be required down gradient from the test plot?

Chapter 6: Monitoring Plan Implementation

(1) Is an appropriate level of detail included on methods and sample collection practices? To what extent should the document cover methods for avoidance of cross-contamination of samples, ensuring consistent collection of soil pore-liquid and ground-water samples, and maintenance of stability of samples in transit and storage before analysis? Should methodological details be left out and it assumed that the registrant will employ whatever state-of-the-art technologies that exist at the time they do the study?

(2) Should we include a list of types of equipment and procedures that have been successfully (or unsuccessfully) used in recent studies?

(3) Should we include a separate list of studies needed to support modeling and relating the study results to what has been observed with the other environmental fate test data? For example should sorption and degradation rate studies be required for the test soil in all cases? Just to support modeling? Should supplemental studies of pesticide degradation and sorption in subsurface horizons be included?

(4) Given the goals and objectives of the ground-water monitoring studies should the proposed Measures to Reduce Sampling Burden be included? Is there too much danger that either of the proposals made (use of the tracer as an indicator for whether pesticide analysis is needed or use of a less specific or less quantitative method for initial screening of samples before requiring more specific analytical confirmation) could compromise the integrity and utility of the study?

(5) EPA has presented criteria (p. 59) for the termination of a Prospective Ground-Water Monitoring Study. Are these adequate and appropriate criteria?

(6) The guidance requires EPA approval/concurrence that the criteria have been met before the study may be terminated. Because EPA review and approval of the Study Termination Report can be delayed (due to Agency workload), EPA is considering allowing registrants to suspend analysis , but to continue to collect samples, until EPA makes its decision on whether to allow the study to be terminated. Is this an appropriate option? Will the samples remain valid for 3-6 months. Are there special handling/storage procedures that should be followed?