UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF
PREVENTION, PESTICIDES, AND
TOXIC SUBSTANCES

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Feb 24, 1999

MEMORANDUM:

SUBJECT: Isoxaflutole Site Selection Report for Tile Drain Monitoring Studies and Prospective Groundwater Studies on Tile Drained Fields (447379-01).

FROM: Ian Kennedy, Hydrologist, and
Bill Effland, Senior Scientist,
Environmental Risk Branch II

Ian Kennedy 3/4/99
William R. Effland

THRU: Elizabeth Leovey, Branch Chief
ERBII/EFED (7507C)

3/4/99

TO: Daniel Kenny, PM Team Reviewer
Registration Division (7505C)

Summary: Rhône-Poulenc will be conducting five tile drain grab sample studies and two tile drain monitoring studies in support of conditional registration for the new corn herbicide isoxyflutole (Balance). The company recently submitted information on ten potential sites for conducting these studies. The information in the site selection report was insufficient for us to properly evaluate the sites, but we believe two tile drain grab sample studies should be conducted this year and we approve "Iowa Site C" a Nicollet loam in Dallas county and "Ohio Site E" a Millsdale silty clay loam in Fayette county for this purpose. Rhône-Poulenc still should supply further information about these two sites to fill in the data gaps outlined below and should supply a more complete site selection report for sites for the remaining three grab sample studies as well as the two detailed tile drain monitoring studies. This report should include information on the tile drain systems, the tillage practices at the proposed sites, the local topography of the proposed sites and information on soil porosity and soil organic matter. Additionally, Rhône-Poulenc has not yet submitted a final protocol for the grab sample studies and should submit one immediately, taking into account some of the points outlined below, most importantly the use of a tracer.

Further work should be conducted by Rhône-Poulenc to find suitable sites for the remaining three grab sample studies and the two tile drain monitoring studies, taking into account the points outlined here. Sites for the tile drain studies should have high water tables, so that the tile system regulates the water table depth, flat or concave surfaces and low organic matter content. Tile systems must be properly functioning and should have been in place for a time long enough that soil structure can be reestablished around the drains. Soil porosity must be sufficient to allow water flow to the tile drains. Site selection reports in the future must include information on soil organic matter content as well as details of the tile drain system.

Rhône-Poulenc has submitted a site selection report outlining five sites each in Iowa and Ohio as candidates for the proposed tile drain grab sample study. Four of these were also selected by Rhône-Poulenc as acceptable for the prospective groundwater study with tile drains. All the sites are in heavy soils of unknown hydraulic conductivity and likely high in organic matter.

There was no information included in the report on the installation date, depth, spacing and current condition of the tile drain systems. In order to conduct a valid study, the tile drains must be functioning properly and in order to properly evaluate the proposed sites we need to know the depth and age of the tile systems. Sketches of the tile systems were provided in the report, but the they were not-to-scale, making it impossible to get more than qualitative information from them. The report was unclear about the source for the information in these sketches.
The soil survey maps contained in the site selection report do not show the boundaries of the proposed sites making it difficult to determine which soils series are present in the proposed study areas. The field plots should be located in concave landscapes, in positions such as depressions.

Although soil cores were taken from all ten sites the report did not state the organic matter content of the soils at the selected sites. The soil series at the sites are generally high in organic matter. The grab sample study, however, does not require organic matter contents as low as a prospective groundwater study.

Rhône-Poulenc also did not report the drainage at the proposed sites. Drainage typical of the proposed soils is somewhat poor to very poor, but the Clarion series is well drained. Because of this, the position typical of Clarion soils at the top of rises (see attached figure) and the low water tables reported, this series makes a poor choice for a tile drain study.

Tillage practices at the site were not mentioned in the report. The two detailed monitoring studies and remaining three grab sample studies should be conducted on fields on which conservation tillage is practiced, and future site selection reports for tile drain studies should mention tillage practices at the sites discussed.

The ten proposed sites have many characteristics in common such as slopes less than 2%, no prior use of the test compound and no nearby potable wells and the presence of tile drains. The ten locations presented in the report can be summarized as follows:

1. Iowa site A, Greene County.
   Clarion loam soil.

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Depth to water table: 6 ft.
Distance to creek: about 2500 ft.
Slope < 2%
Size: 160 acre field with a 3 acre tiled portion in the southeast corner.
Convex surface - surrounding portions of the field slope away from the proposed site

2. Iowa site B, Guthrie County.
Colo Silty Clay loam soil.
Depth to water table: 5.5 - 6 ft.
Adjacent to Creek.
Slope < 2%
Size: 25 acres, with 10 acres tiled
Surface shape not reported

3. Iowa site C, Dallas County.
Nicollet loam and Canisteo silty clay loam.
Depth to water table: 6 ft.
Adjacent to creek
Slope = 2%.
Size: 2.5-3 acres, all tiled.
Surface shape not reported

4. Iowa site D, Greene County.
Clarion loam with Nicollet loam on one side
Depth to water table: 6 ft.
Adjacent to creek.
Slope: 0-5% with slope increasing at the top end of the field.
Size: 2-5 acres (?), all tiled.

5. Iowa site E, Dallas County.
Clarion loam with Canisteo silty clay loam on one side
Depth to water table: 7 ft.
Distance to creek: 0.5 miles
Slope 0-2%
Size: 42 acres with two tile systems. The smaller of these two would be used
Surface shape not reported

6. Ohio site A, Wayne Township, Fayette County.
Brookston silty clay loam and Crosby silt loam
Depth to water table: 6ft.
Distance to creek: 2 miles
Slope 1%
Size: 15 acres, all tiled
Flat surface.

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7. Ohio site B, Wayne Township, Fayette County.
   Brookston silty clay loam and Crosby silt loam
   Depth to water table: >8 ft.
   Distance to creek: 200 yd.
   Slope < 2%
   Size: 36 acres, 10 acres tiled.
   Flat surface.

8. Ohio site C, Goshen Township, Auglaize County.
   Milford silt clay
   Off-label soil
   Depth to water table: 8-12 ft.
   Distance to creek: 1 mile
   Slope <2%
   Size: 285 acres, with tiled areas of 20-30 acres.
   Flat surface.

9. Ohio site D, Bloom Township, Wood County.
   Hoytville clay
   Depth to water table: >8 ft.
   Distance to creek: 2 miles
   Slope: <2%
   Size: 10 acres, all tiled
   Flat surface.

10. Ohio site E, Wayne Township, Fayette County.
   Millsdale silty clay loam
   Depth to water table: 4.5 ft.
   Distance to creek: 100 yd.
   Slope: < 2%
   Size 17 acres with 8 acres tiled.
   Flat surface.

Additional points on the proposed sites are as follows:

- The areas surrounding Iowa site A slope away from the site indicating that runoff is likely to leave the test area and making this site unacceptable. The site also contains three soil series, Clarion, Nicollet and Webster.
- Iowa site B appears to have a uniform soil.
- Iowa site C has two soil series present, Nicollet loam and Canisteo silty clay loam. The field is triangular in shape with an unusual tile pattern.
- Iowa site D has a 5% slope on the uphill side of the plot
- Iowa site E can get runoff from adjacent areas; has a water table below 6 ft.

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- Ohio Site A has some sandy horizons, which could complicate water flow.
- Ohio Site B has a water table below 8 ft.
- Ohio site C tile system has several outlets and a water table guessed at 8-12 ft.
- Ohio site D has a water table below 8 ft.
- Ohio site E has a water table of only 4.5ft, but only the uphill portion of the field is tiled.

Some protocol outlines were included in the site selection report. EFED has not yet received a final protocol for the tile drain grab sample study, but the outline in the introduction to this report raises some questions.

- The outline does not mention a tracer, which must be applied in any monitoring study. A study conducted without a tracer is useless unless large amounts of the test compound are detected in the tile drain effluent. The use of a tracer was previously agreed to by Rhône-Poulenc.
- The outline states that water from the tile drain will be monitored, but does not say how. EFED prefers continuous monitoring as well as volume based sampling of the tile drain effluent. Tile systems can drain fields rapidly during storm events and effluent peaks can pass through in as little as 4 hours (Czapar et al 1994). Daily sampling could miss the outflow of the chemical entirely. This is another reason a tracer must be applied in all studies.
- The outline states that daily sample will be taken, one from the drain outlet, one from the drainage ditch and one from a nearby stream, but does not state where in the ditch and stream. These samples should be taken near the outlet from the tile drains and near the outlet from the ditch, respectively. Additionally, daily sampling is insufficient for sampling tile drains during high flow periods.
- The sites should be checked for ponding at each sampling time. This could be done by noting any relatively low lying areas of the plot and visually inspecting them at sampling times.
- Some additional information on conducting tile drain studies can be found in the two references below and probably numerous others in the literature.

The site selection report contains insufficient information to properly evaluate the sites for either the tile drain grab sample studies or the tile drain monitoring studies. However in the interests of running some grab sample studies in 1999 we recommend that two such studies be conducted, one at Iowa site C and the other at Ohio site E.

References

Czapar, G.F., R.S. Kanwar and R.S. Fawcett, 1994. Herbicide and tracer movement to field drainage tiles under simulated rainfall conditions. *Soil & Tillage Research,* 30: 19-32.

Kanwar, R.S., D.G. Baker, G.F. Czapar, K.W. Ross, D. Shannon, and M. Honeyman.

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General Soil Map Units

The general soil map at the back of this publication shows broad areas, called associations, that have a distinctive pattern of soils, relief, and drainage. Each soil association on the general soil map is a unique natural landscape. Typically, a soil association consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one association can occur in other associations but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure.

The soils in any one association differ from place to place in slope, depth, drainage, and other characteristics that affect management.

1. Clarion-Webster-Nicollet association

Nearly level to moderately sloping, well drained, poorly drained, and somewhat poorly drained, loamy soils formed in glacial till and local alluvium from till; on uplands

This association is characterized by an undulating ground moraine of swales and rises that differ from about 5 to 10 feet in elevation. Surface drainage is not well developed, and runoff water commonly accumulates in scattered depressions (fig. 2). Slopes range from 0 to 9 percent.

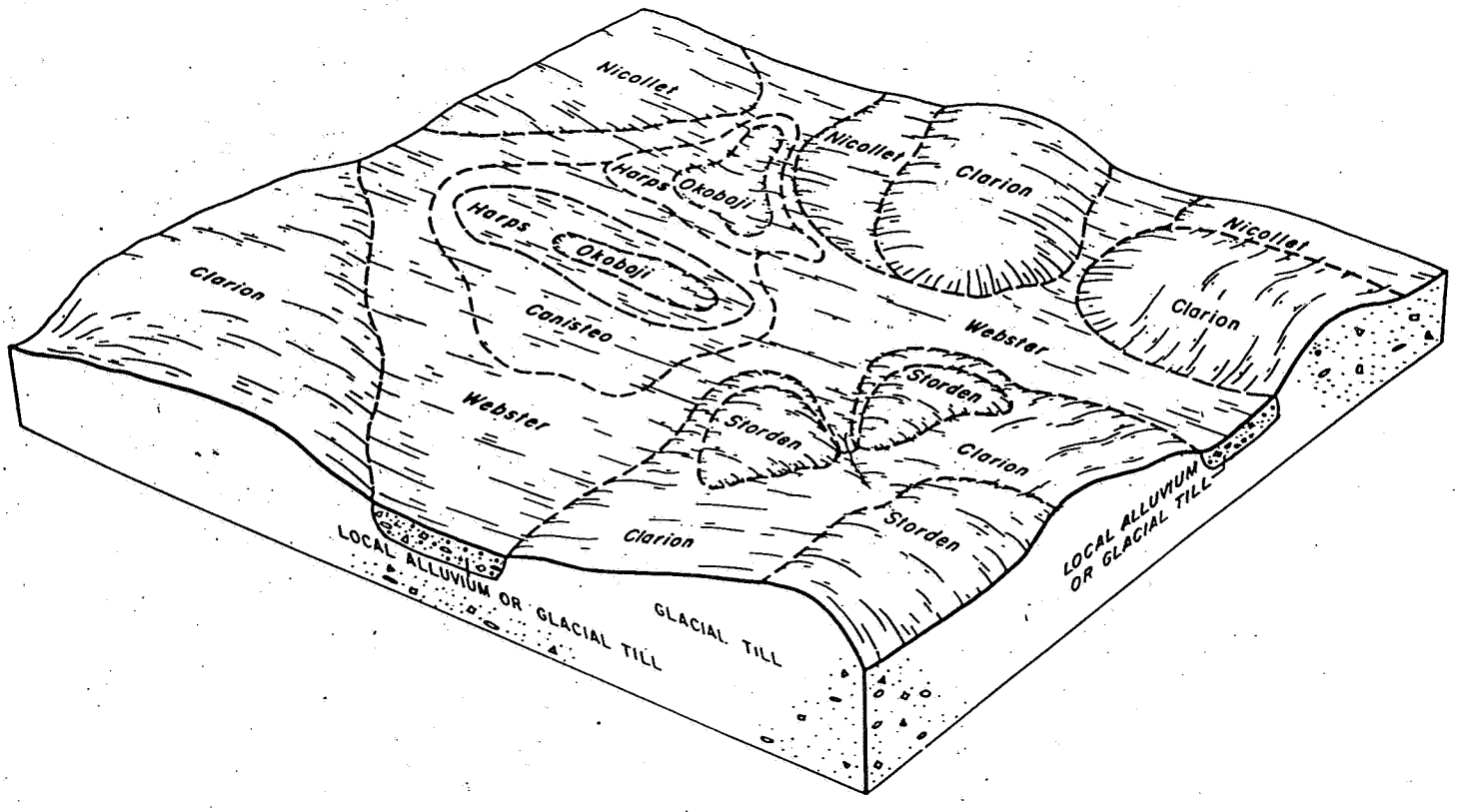

Figure 2.—Pattern of soils and parent material in the Clarion-Webster-Nicollet association.