6-14-85 Field Study Peer Review

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RANDUM

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: Peer Review Panel

ct: Peer Review of the Bolero Field Study in Rice, 1982-1984,
at Matagorda, Texas.

is a report of the consensus opinion of a peer review panel appointed
view a field study in a brackish water system subject to introduc-
of Bolero 8 EC (thiobencarb) residue from its use as a rice herbi-
. A three-year field study was required as a condition of registration
ise EEB's previous reviews led to a presumption of hazard for marine/
rine organisms, particularly commercially important invertebrates such
rimp. Mr. Dan Rieder of EEB reviewed the study and provided the panel
a data evaluation record (DER) which found that the study was scientifi-
/ sound and fulfills the data requirement.

panel finds that the study can be considered no better than supplemen-
that is certain data contained in the study may be of use to EEB in its
d assessment of thiobencarb. The panel considered three (3) study def-
ncies to be decisive.

Controls

The control of this test was not clearly established. We found the use of
both a "baseline" year and separate "control" station (IX) a bit confusing
because depending on the parameter (physical, chemical, biological) and
time frame, comparisons were made between the experimental data and the
"control" data at either the baseline year sites or control site IX. There
does not appear to be a clear synthesis of how the various controls
work together to provide a better understanding of the experimental results.

The panel notes that the baseline year sites (which are the same as the
experimental sites and control station IX in treatment years) were contam-
inated with thiobencarb residue (up to 9 ppb measured in water). Fish at
four sampling sites were also contaminated in the baseline year. Very high
levels of Bolero (up to 7.9 ppm) were also found in baseline year shrimp.
Some of the shrimp and fish contamination is thought to be due to laboratory
contamination because high levels were noted in the same replicates on the
same days. However, in other instances ( particularly with baseline year
shrimp ) the finding of thiobencarb residues cannot reasonably be attributed
to laboratory contamination.

(1)

In the baseline year protocol the authors state the purposes of the baseline year survey as: 1) to collect biotic and abiotic data to establish the structure and function of the system so as to compare to treatment years - this includes establishing suitable study parameters for the treatment years and measuring biotic and abiotic "fluctuations" (seasonal and annual); 2) locate and establish approriate control stations based on same biotic and abiotic characteristics and potential for exposure to rice pesticides; 3) document residues; 4) provide a subsequent year plan.

Based on the stated objectives of the protocol for the baseline year the panel finds that the study only partially met the objectives. Appropriate data was collected but we could not determine if or how any selectivity was applied to those data vis a vis "establishing suitable study parameters for the treatment years" . Objective No. 2 was not met because the control station (IX) already existed during the baseline year and no additional control sites were established as a result of the baseline survey. Also it was unclear how control station IX was established. Did it accurately represent the experimental ecosystem (sampling stations adjacent to Mike Otis Farm) ? Control station IX obviously was not free of pesticide influence since Bolero residues were detected there (up to 3.9 ppb in water). Objective No. 3 was only partially met because only thiobencarb residues were monitored (see No. 2 below for a discussion of other toxic pesticides which could have impacted the experimental sites).

Perhaps most important to the interpretation of the results of this study are the investigator's own view of the controls and baseline year. In the consultants protocol for the baseline year study the author described the establishment of the upstream control station (IX) as follows:

> " One major objective of the baseline survey is to establish an appropriate control station. A control station is a reference point to which comparisons can be made during the treatment year. This station should have similar chemical, physical and biological characteristics and be uninfluenced by pesticide or herbicide run-off. During the treatment year, changes in the the test system will be compared to those in the control. Variations in the structure and functioning of the control station may be assessed and applied as a correction for observed variation at the test site. If a suitable control site is not available, data from the study site before Bolero treatment will have to be compared to treatment years. This approach risks natural perturbation causing fluctuations in the drainage ditch community which are unrelated to treatment."

Thus, we know their intention was to relate the experimental data (that following Bolero treatment at the sample stations) to the control station IX data. Since the control station IX data is very questionable as a contaminated control (concluded by the DER and concurred with by this panel), the intended comparisons also become questionable, if not invalid. We know from the protocol that if an appropriate control was not available, the plan was to compare the experimental data to the baseline year data. However, we also know that the investigator recognized that this approach has inherent "risks", i.e., introducing non-tretament related fluctuations (such as natural population fluctuations). Thus, the panel is forced to conclude that a comparison of the experimental sampling site data with the baseline year

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sampling site data must factor in an analysis of non-treatment related fluctuations.

2. Potential for contamination of the study sites with other toxic herbicides.

Other rice herbicides and chemical treatments were used on rice fields which, according to the study diagrams, directly drain (via common drainage canals) into the sampling sites. These other chemicals represent common rice agricultural practice in the Matagorda area and include: Ordram (highly toxic to aquatics; fish kills on record; fish $LC_{50}$ = 0.21 ppm; invertebrate $LC_{50}$ = 0.34 ppm); Propanil; and Basegran. No residue monitoring for these chemicals was undertaken. Since the potential for contamination via direct drainage into the sampling sites was known to the company prior to initiating the treatments, the study should have addressed the residues of these other toxic chemicals at the sampling sites.

3. Sampling Effort

Although a very large number of samples were collected over the three years of this study, the sampling effort does not appear to be uniform year to year. There is a very poor effort in the third year of the study. This is particulary unfortunate since adverse trends, should they be present, would be expected to materialize in the third year if reproduction is impaired. The gravid shrimp (of particular interest in the hazard assessment) were very poorly sampled in the third year. The panel recommends that the sampling effort be analyzed in order that we may better understand any trends in the data.

Shannon-Weiner Index

While not a study deficiency per se , the panel questions the calculation and validation of the Shannon-Weiner Indices, specifically as to the inclusion of grouped taxa in the equations.

Conclusions of the Peer Review Panel

The panel finds that the study is no better than supplemental, but that the thiobencarb residue data obtained may be of use to support the presumption of hazard made in previous reviews. However, the materials, techniques and analytical methodologies should be reviewed and validated. Specifically, it should be determined whether or not "spiked" samples were analyzed so as to indicate the reliability of the methods and results.

At this time the panel is unable to support the registrant's conclusion negating the presumption of hazard. However, until a validation of the statistical analysis of the results of this study is performed, a comparison of the experimental treatments and the baseline year data which also factors in non-treatment related fluctuations, cannot be made. Once this is accomplished the problems associated with the controls and the performance of the study ( Nos. 1-3 above ) must be addressed and reconciled. Without the recommended analyses and reconciliation, the panel will not be able to support a finding of adverse effects in this study.

For the above reasons the panel can only reserve judgement as to the use of this study in assessing potential for ecological hazard.

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thiobencarb file

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