THE CENTER FOR FOOD SAFETY

February 20, 2007

Docket No. APHIS-2006-0166
Regulatory Analysis and Development, PPD
USDA APHIS, Station 3A-03.8
4700 River Rd., Unit 118
Riverdale, MD 20737-1238

Re: Public Comment on APHIS Notice of Intent to prepare an Environmental Impact Statement and proposed scoped study regarding proposed use of genetically engineered fruit fly and pink bollworm.

Dear Sir/Madam:

The Center for Food Safety (CFS) submits this public comment on the scope of the above-referenced EIS. The Center for Food Safety (CFS) is a non-profit public interest and environmental advocacy membership organization established in 1997 by its sister organization, International Center for Technology Assessment, to use science and the law to address increasing concerns over the impacts of the U.S. agricultural system on human health, animal welfare, and the environment. CFS combines multiple tools and strategies in pursuing its goals, including litigation and legal petitions for rulemaking, legal support for various sustainable agriculture and food safety constituencies, as well as public education, grassroots organizing and media outreach.

On July 19, 2001, CFS and the International Center for Technology Assessment (ICTA), with the endorsement of other groups, submitted comments on the draft Environmental Assessment (EA) on the confined field study of the same GE species requesting a full EIS be prepared. On September 26, 2001, we also filed a separate legal petition to USDA APHIS requesting a number of regulatory actions related to GE arthropods and again requesting a full EIS prior to any field releases of the GE pink bollworm. On March 26, 2002, we filed public comment on EIS scoping on the proposal by USDA APHIS to conduct field releases of transgenic pink bollworm.

We again applaud the APHIS commitment to prepare a full EIS under NEPA. As such, the EIS itself will represent an important precedent and must be prepared with the highest degree of professionalism and objectivity. **We request, in accordance with the CEQ NEPA implementing regulation on scoping at 40 CFR § 1501.7 and other applicable law, that the**

Main Office: 660 Pennsylvania Ave., S.E., Suite 302, Washington, D.C. • Phone: 202-547-9359 • Fax: 202-547-9429
California Office: 2601 Mission Street, Suite 803, San Francisco, CA 94110 • Phone: 415-826-2770 • Fax: 415-826-0507
Email: info@centerforfoodsafety.org • www.centerforfoodsafety.org • www.foodsafetynow.org

preparation and scope of the EIS take into account the following significant issues, none of which have been fully addressed in any prior NEPA document:

Scoping Comment 1 – Hard Look: The EIS must be a "hard look" decision document, as is required by NEPA. Previously APHIS prepared the EA internally on this controversial proposal that is put forth by APHIS itself. Unfortunately, this conflict of interest resulted in the draft EA manifesting a clear predetermination in favor of granting the permit. Indeed, the draft EA failed to comply with basic NEPA regulations and guidelines; nor was the revised EA adequate. In contrast, the planned EIS must provide a balanced assessment of costs and benefits that is transparently documented.

Thus, a strong need exists in this high-profile situation for the EIS to be contracted out to an outside consultant, rather than internal analysis. Independent EIS preparation is common for Federal proposals and very appropriate here to avoid the temptation toward bias.

Scoping Comment 2 – Independent Review: The EIS must incorporate independent review by scientists not closely allied with the project, with expertise in appropriate disciplines. Clear evidence of independent evaluation of the project proponent's assertions must be included, to avoid conflict of interests, in compliance with 40 CFR § 1506.5.

Scoping Comment 3 – Purpose and Needs: The EIS should include clear Purpose and Need sections. 40 CFR § 1502.13. These sections must include basic information as to whose needs and precisely what needs are driving the proposal. General assertions of potential beneficial purposes must be avoided in favor of concrete discussions of the intended applications in agriculture for this technology, to which substantial APHIS resources - and taxpayer funds - already have been devoted.

Scoping Comment 4 – Project Description: The description of the Proposed Action section must include: 1) actual locations of the releases, 2) the dates and duration of the releases, 3) who will have access to them, 4) the nature of the equipment involved, and 5) any proposed mitigation for both mechanical and biological impacts at or near the release site(s). If APHIS refuses to give the actual location, it must provide a detailed justification for doing so and at least provide a more detailed description of the surroundings so that the decision makers and the public are not left to guess about the fundamental environmental conditions.

Scoping Comment 5 – Affected Environment: The EIS should include a full section on the Affected Environment, 40 CFR § 1502.15, and give information on the climate conditions (temperatures, rainfall, high winds, probability of severe weather events, etc.).

Scoping Comment 6 – Description of Flora: The EIS should include a full description of the cotton types and other flora in and around the release site(s). It is scientifically documented that pink bollworms develop and mate differently ("developmental asynchrony") on GE and non-GE cotton (Liu *et al.* 1999). Logically, the releases should take place on both GE and non-GE cotton. Further, the EIS should analyze the differing susceptibility of GE and non-GE cotton to pink bollworm damage, which will affect the overall need for the proposal.

The EA on the confined field tests mentioned that alternate hosts for the pink bollworm are known - okra, kenaf, and hibiscus. But, have any other potential hosts been identified? Could they include weeds present in or around the fields? Have the GE pink bollworms been tested on those weeds? The earlier EA section "Description of Research" includes the suggestion - without any citation to evidence - that actually the pink bollworm will **not** use the neighboring hibiscus plants. The EIS should discuss this contradiction and explain any "non-host switching" assertions when the species has a documented history of doing so. .

Scoping Comment 7 - Alternatives: The EIS description of the Action Alternatives should include several feasible alternatives to fulfilling the purpose and need for the Proposed Action. 40 CFR § 1502.14 ("this section is the heart of the environmental impact statement"). The APHIS Notice includes only three alternatives: 1) Take no action; 2) Expansion of existing plant pest control program; and 3) Integrating genetically engineered insects into the existing plant pest control program. These alternatives describe broad categories that should be more narrowly focused. The EIS should also consider: at least one alternative involving a different approach to genetic engineering of the pink bollworm not involving use of an autocidal gene; one alternative involving improvement of the sterile pink bollworm release program through approaches not involving genetic engineering; and one alternative approach to pink bollworm control not involving sterile insect release. Effects (positive and negative) of each proposed alternative must be assessed with equivalent care and detail as effects of the proposed action. APHIS must "rigorously explore and objectively evaluate all reasonable alternatives, and for alternatives which were eliminated from detailed study, briefly discuss the reasons for their having been eliminated." 40 CFR § 1506.5.

Scoping Comment 8 – Protocols for Impact Analysis: The EIS should follow prescribed protocols for impact analysis, as set forth by Young, Ingebritsen, and Foudin (1999, at pp. 371-75), all of whom work or worked for APHIS in biotechnology permitting. These protocols previously were approved for publication and adoption by APHIS. First, the EIS should provide the detailed information outlined therein, in the sections entitled "20.3.4 - Evaluation of the Nontransgenic Form Proposed for Introduction" and "20.3.5 Evaluation of the Transgenic Form." Any impacts of the transgenic form must be assessed in a broad ecosystem context, looking at potential long-term impacts across the broad array of potential habitat types in the U.S. and abroad in which the GE pink bollworm and Drosophila foreseeably would be released in the future should the technique prove feasible.

Scoping Comment 9 – Analyze Plant Pest Issues: This assessment should include the duty to avoid introduction of a plant pest under the Plant Protection Act (PPA), the duty to avoid harm to native species and their habitats and to consult with the U.S. Fish and Wildlife Service on how best to do so under the Endangered Species Act (ESA), compliance with Executive Order 13112 on Invasive Species, and compliance with relevant state laws.

Hoy (1999) and others have identified the potential invasiveness of GE arthropods as a risk of key concern due to potential impacts on native species and other values. An important duty rests on Federal agencies to take careful steps to avoid the introduction of harmful invasive species

(whether GE or non-GE), under EO 13112 of February 3, 1999. **Here APHIS proposes to deliberately introduce a well-known invasive pest, the pink bollworm.** The EO, still in effect, provides in pertinent part:

> *Section 2. Federal Agency Duties.*
>
> *(a) Each Federal agency whose actions may affect the status of invasive species shall, to the extent practicable and permitted by law,*
>
> *(1) identify such actions;*
>
> *(2) subject to the availability of appropriations, and within Administration budgetary limits, use relevant programs and authorities to: (i) prevent the introduction of invasive species;....*
>
> *(3) not authorize, fund, or carry out actions that it believes are likely to cause or promote the introduction or spread of invasive species in the United States or elsewhere unless, pursuant to guidelines that it has prescribed, the agency has determined and made public its determination that the benefits of such actions clearly outweigh the potential harm caused by invasive species; and that all feasible and prudent measures to minimize risk of harm will be taken in conjunction with the actions.*

Because APHIS here intends to "authorize, fund, or carry out actions" that "may affect the status of invasive species" (the pink bollworm), the EIS must address how this fits with appropriate guidelines addressing the benefits and harms and ways to minimize the risks. In sum, with Office of General Counsel assistance, the EIS should discuss the applicable Federal and State authority and indicate how the various alternatives may or may not be consistent with them, including the "guidelines" requirements of EO 13112.

Scoping Comment 10 – Genetic Stability and Quality: The EIS should assess genetic stability and quality control risks in the use of GE pink bollworms and Drosophila, such as the potential to "impact negatively on important life traits, e.g., longevity, irrespective of whether the transgene is expressed or not" and other impacts, per Robinson and Franz (1999, at p. 309-10). Further, the EIS should assess potential long-term impacts of the proposal and the alternatives on the availability of space in mass-rearing facilities for GE insects and impacts on the pending need "to drastically improve quarantine precautions" for rearing facilities, as stated by Robinson and Franz (1999, at pp. 315-16).

Scoping Comment 11 – Horizontal Gene Flow; Transposons, Transduction: The EIS should fully assess any transposons that could result in horizontal gene transfer. The EIS should fully assess the use of *piggyBac* transposon in relation to baculovirus, and any other virus or microorganism being used in the genetic transformation of the insects, and analyze the likelihood that the virus will rescue the inserted transposon and mobilize it for transfer to cotton, other plants, and animals, such as mammals (including humans). The 2004 Report prepared by the Pew Initiative on Food and Biotechnology explains that "transposons [sections of DNA that can move to new locations in the DNA] sometimes escape their hosts and move to new ones." (*Bugs in the System?: Issues in the Science and Regulation of Genetically Modified Insects*, Pew

Initiative on Food and Biotechnology, January 2004, available at http://pewagbiotech.org/research/bugs/bugs.pdf (last visited February 12, 2007), p. 36. (Hereinafter "Pew Report".) Horizontal transfer of this type has been observed in the fruit fly, and must be carefully examined here. (*Id.*)

As stated in the previously-submitted comment on the draft EA by Professor Joe Cummins of the Univ. of Western Ontario and Dr. Mae-Wan Ho of the Institute of Science in Society, "adequate laboratory studies must be done prior to the field release of potentially dangerous organisms." (Comments of July 9, 2001). In those comments, Drs. Cummins and Ho also provide evidence that *piggyBac* transposon vectors carrying transgenes are unstable and can undergo secondary mobilization to transfer horizontally. Conducting a release in which these potentially significant impacts could occur would be flagrantly irresponsible. The EIS should provide a detailed analysis **based on published, peer-reviewed, studies in the laboratory** of the potential for the various proposed, planned, and foreseeable genetic transformations of the pink bollworm to cause harmful changes in cotton, other plants, and animals.

The EIS should also assess the potential for gene transduction, movement of DNA from one cell to another via a virus. Insect viruses pose the risk of mediating horizontal DNA transfer, creating the potential that genetically engineered genes could move from one species to another. (*Pew Report* at 37). The EIS should assess this as a potential human health impact, and as a potential impact on the environment.

Problems associated with horizontal gene flow must be studied carefully. The environmental and health risks are similar to those associated with sexual transmission, but the possible recipients of novel traits are not limited to sexually compatible species. (*Id*. at 38.) The Pew Initiative on Biotechnology reports that horizontal gene transfer has the potential to "drive some recipient populations to extinction due to increased mutation rates if active transposable elements were moved into a new host as has happened with small populations of the fruit fly *Drosophila* (French *et al.* 1999)." (*Id.* at 38.) Given that this project proposed to genetically modify Drosophila in particular, ultra-careful scientific review is necessary.

Scoping Comment 12 – Gene Silencing: "Gene silencing," the failure of a genetically engineered trait to function, is another possible human health risk involving the release of GM insect. (*Pew Report* at 39.) Gene silencing can pose a problem when it occurs in a pest insect that was genetically modified to confer a benefit – if that benefit is lost, then the release of the supposedly modified insect can simply be a release of more pests, or the genes can spread more easily, rather than contain the target pest problem. (*Id.*) The EIS for GE Bollworm and GE *Drosophila* must consider the possible environmental and human health affects associated with gene silencing.

Scoping Comment 12 – Assess APHIS science: The EIS should assess the adequacy of APHIS's scientific underpinning of the Proposed Action, as was questioned with respect to the draft EA by a leading GE arthropod researcher, Dr. David O'Brochta of the University of

Maryland Biotechnology Institute (comment of July 12, 2001). Dr. O'Brochta's key points related to potential impacts that are so important that the relevant verbatim excerpts are appended hereto and incorporated into this scoping comment by reference. The bulk of Dr. O'Brochta's points under the headings "Stability," "Potential Transfer to Other Organisms," "Host Range Data," "General Considerations," and "Conclusions," specifically aim at the impacts of unconfined field releases. The EIS should address each of those points.

Scoping Comment 13 – Methodology and Scientific Accuracy. To insure the scientific integrity of the analyses in the EIS, APHIS must "identify any methodologies used and shall make explicit reference by footnote to the scientific and other sources relied upon for conclusions in the statement." 40 CFR § 1502.24.

Scoping Comment 14 - Endangered Species Consulting and Analysis. The EIS must list the Federally listed or proposed threatened or endangered (T/E) plants or animals in the potential field release vicinity, or their designated or proposed critical habitats. APHIS must consult with the U.S. Fish and Wildlife Service (FWS), and conduct Endangered Species Act (ESA) compliance by providing a detailed description of the listed or proposed T/E species, including designated or proposed critical habitat, and by analyzing any potential impacts, after first consulting and/or conferring with FWS Section 7 scientists, who must be identified in the list of agencies or persons consulted.

Thank you for your consideration of these comments; we look forward to your written responses to each of them separately, including those incorporated in the Appendix. For further information, please contact Kevin Golden, Staff Attorney, Tel: (510) 590-1479 ext. 303; email: kgolden@icta.org . Please notify him immediately of any future decisions related to the EIS.

Sincerely,

/s/

Kevin Golden
Staff Attorney

Literature Cited

Hoy, M.A. 1999. Deploying transgenic arthropods in pest management programs: risks and realities. In A.M. Handler and A.A. James, ed.s, *Insect Transgenesis - Methods and Applications*, CRC Press, Boca Raton, FL.

Liu, Y-B., B.E. Tabashnik, T.J. Dennehy, A.L. Patin, and A.C. Bartlett. 1999. Development time and resistance to Bt crops. *Nature* 400:519.

Robinson, A.S., and G. Franz. 1999. The application of transgenic insect technology in the sterile insect technique. In A.M. Handler and A.A. James, ed.s, *Insect Transgenesis - Methods and Applications*, CRC Press, Boca Raton, FL.

Young, O.P., S.P. Ingebritsen, and A.S. Foudin. 1999. Regulation of transgenic arthropods and other invertebrates in the United States. In A.M. Handler and A.A. James, ed.s, *Insect Transgenesis - Methods and Applications*, CRC Press, Boca Raton, FL.

APPENDIX

Incorporated excerpts of comments by:

David A. O'Brochta, Ph.D.
Associate Professor
University of Maryland Biotechnology Institute
Center for Agricultural Biotechnology

Note: the incorporation of these excerpted public record comments does not imply any permission was granted or any connection exists between Dr. O'Brochta and CFS or ICTA.

Environmental Assessment of "Confined field study of a transgenic pink bollworm, Pectinophora gossypiella (Lepidoptera: Gelechiidae)."

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Stability - This Application.

One of the oft-stated risks associated with transgenic organisms is the creation of genotypes and phenotypes that are unwanted and unexpected. Changes in life history characteristics and ecological requirements such as latitudinal range and host range are examples of changes that might add to the risk of an organism to the ecology, the economy or to human health. Our abilities to assess the magnitude of these risks will depend, in part, on the stability of the genotype and phenotype of the transgenic organism. Again, this depends, in part, on the stability of the gene vector/transgene.

The transgenic pink bollworms were created using a binary vector system consisting of a non-autonomous (i.e. not self-mobilizable) *piggyBac* transposable element/gene vector and a non-integrating source of *piggyBac* transposase. Using such a system contributes to the stability of the genotype of the resulting insects but it does not permit any conclusion about the actual stability of the gene vector/transgene. The authors have looked for genomic DNA sequences within the pink bollworm that show similarity to the transposase coding region of the *piggyBac* transposable element and have found none. Failure to find similar sequences (what level of similarity could they detect using their methods?) is a useful observation but also does not address the question of gene vector/transgene stability directly.

The only test of gene vector/transgene stability was the phenotypic analysis of about a thousand progeny from a backcross in which the gene vector/transgene was expected in 50% of the progeny if it was inherited as a stable, single copy Mendelian trait. The authors found no deviation from the expected 50% ratio and concluded that the gene vector/transgene was stable. This conclusion is unwarranted. The test for stability described in the Environmental Assessment would only permit very high rates of movement (excision or transposition) to be detected. It is quite possible that the line of insects they are working with has a 1% rate of movement and their statistical test would never have detected it. The test used was weak, at best, and probably just not appropriate. Of more significant concern however is the authors conclusion that these data demonstrate stability. At best the authors might be able to say that if the gene vector/transgene is moving it is doing so at a rate of less than approximately 1%. It should be noted however that a rate of movement of even 0.1% would indicate the presence of a fairly active transposon. My concern is that the authors have not adequately considered the issue of stability, how it is measured and what it tells us. I am also concerned with the how negative data are being interpreted and presented. It is very important, probably more so for risk related questions, to be fully aware of the limits of the methods being used to detect something. A negative result should be stated in a way that reflects those limits. In this case the authors should be acknowledging that what they can say from their data is that the rate of movement of their transgene is less than 1% not that it is zero. In conclusion, the investigators have not addressed the question of stability in a meaningful way and they should make no presumptions about that here.

Stability - Relevance to this application.

Given the nature of the proposed studies it is fair to ask whether the question of stability is of any relevance at all in the assessment of the potential environmental impact of the proposed studies. It is arguably relevant to this study but will certainly be relevant to subsequent studies of these insects outside the laboratory. So any future experiments will require good data on stability.

Given the planned use of these insects in a mass rearing operation one would think the question of stability would be of a high priority since even very low levels of instability could minimize the utility of the insects within their program. Unacceptable levels of instability under mass rearing conditions in the lab may disqualify these particular transgenic insects as candidates for use in the pink bollworm SIT program. If that were the case then testing them outside is unwarranted. Consequently the question of stability cannot be avoided and I would argue that first field tests

of a transgenic insect should be done with a degree of rigor that will withstand even the harshest of objections.

Potential Transfer to Other Organisms.

The Environmental Assessment has not considered the potential transfer of the gene vector/transgene to viral pathogens. There is some irony associated with this omission because the *piggyBac* transposon used in the creation of the gene vector used by these investigators was discovered approximately fifteen years ago by virtue of the fact that it had jumped from the genome of a lepidopteran host *(Trichoplusiani)* to the genome of a viral pathogen (baculovirus). The *piggyBac* transposable element provides us with an intriguing look at the biology of a transposon and seems to provide us with a glimpse of how these elements might traverse species boundaries. Of course, the key to the appearance of *piggyBac* in the genome of a baculovirus was the instability of the transposable element within the genome of the lepidopteran host. The instability in this case was in somatic cells in culture.

The proposed experiments minimize the chances for transfer to viral pathogens (such as baculoviruses) because of the experiments transient nature and the ability to recover all animals prior to or shortly after they die. This will not be the case in future experiments. Of more concern to me at this time is the apparent less-than-complete knowledge of the authors about the gene vector they are employing and their failure to adequately consider some of the more obvious risks that follow directly from the established biology of the material being used.

Host Range Data.

There is a general lack of host range data for all insect gene vectors (except the Drosophila P element) that make it difficult to address the question of risks to non-target organisms adequately. This dearth of data needs to be addressed by the scientific community as a whole. It is particularly important because while gene vector/transgene instability may increase the chances of transfer to a non-target species the question concerning the behavior of the gene vector once in this new cellular environment are perhaps more important. If the gene vector can not function in vertebrate cells, for example, then the question of transfer to these non-target species becomes less of an issue. This type of host range data is readily obtainable and would be a great benefit to the field as a whole. The USDA should support, encourage and provide the

resources for such studies; they would go a long way in addressing important elements of risk.

General Considerations.

The authors report that life history data for the transgenic insects was collected in the laboratory as part of their effort to evaluate the phenotype of these insects. These types of studies are prudent but in this case the data are not accessible for independent review. The data were not published in a peer reviewed journal and it was not even clear if the report of these data actually exists in a written form.

Numerous safeguards for containment and mitigation are proposed and these seem reasonable.

Conclusions

I am dissatisfied with the Permit and Environmental Assessment review process. A formal process for independent review by peers or experts is needed.

I am dissatisfied with the level of knowledge of the investigators about the biology of the recombinant DNA material being used in these experiments and how that biology relates to issues of risk.

I am dissatisfied with the quality of data and its interpretation as it relates to issues of risk.

Insufficient care and time are being devoted to experimentally dealing with issues related to risk.

[end of O'Brochta comment excerpt]